JOURNAL

OF

THE FRANKLIN INSTITUTE

OF THE STATE OF PENNSYLVANIA

FOR THE

PROMOTION OF THE MECHANIC ARTS.

APRIL, 1850.

CIVIL ENGINEERING.

Extracts from the Third Annual Report of the Directors of the Pennsylvania Railroad Company to the Stockholders, October 31, 1849.

In obedience to the 19th Section of the charter, the Directors of the Pennsylvania Railroad Company present to the Stockholders a statement of the affairs of the Company, for the fiscal year ending on Oct. 31, 1849.

The Report of the Treasurer, herewith submitted, states the amount received up to that date from subscriptions and other sources, to have been . . . . $3,622,035·00

And the amount disbursed, ... 3,123,364·71

Leaving a balance of . . 498,670·29

If to this balance be added the amount of uncollected subscriptions, including the second subscription from the City of Philadelphia, about . . 1,900,000·00

We have the sum of . . . $2,398,670·29

applicable to the construction and equipment of the road.

The report of Herman Haupt, Esq., Superintendent of Transportation, shows the earnings on the small section of the road in use to have exceeded the most sanguine anticipations, and embodies more cogent reasons for its immediate extension than could be adduced in any mere speculative argument as to its future profits.

The arrangement consummated with the Harrisburg, Portsmouth, Mount Joy, and Lancaster Railroad Company, has given the public more comfortable means of conveyance, and an increased rate of speed at a reduced cost, and will, it is hoped, result advantageously to the interests of both Companies.

With a view, as well to the accommodation of the citizens of our own State, as to the increase of revenue usually attendant on moderate charges, the Board have determined to reduce the fare for way travel, after the first of January, 1850, to the uniform rate of three cents per mile.

Extract from the Second Annual Report of the Chief Engineer.

PROGRESS OF THE ROAD.

The Road was opened on the 1st of September to Lewistown, 60¾ miles from Harrisburg, and has since been in uninterrupted use to that place. Owing to the unusual amount of sickness that has prevailed along the Juniata below Huntingdon, in consequence of the extreme low stage of water, the progress of the work above Lewistown has been greatly retarded, particularly upon the mechanical portions of it, which were almost wholly suspended during September and October, from the impossibility of procuring workmen. Since this region has again become healthy, the work has been resumed, and is being pressed with as much vigor as circumstances will permit. The long deep cut back of Newton Hamilton is nearly finished, and that two miles on this side of it, which was also retarded by the failure of the original contractors, will be through in January.

We entertain expectations of being able to reach Huntingdon in the spring, and feel no doubt but that we shall complete the whole of the Eastern Division in time for the ensuing fall trade.

A few miles above Huntingdon, the line enters the valley of the Little Juniata, which has always been free from the autumnal diseases that prevail on the lower portions of the stream, and in consequence, the work along it has progressed very satisfactorily, and will be ready in due time for the superstructure, for which materials are being delivered.

A portion of the grading of the Western Division, embracing fifteen of the heaviest sections along the valley of the Conemaugh, was placed under contract on the 12th ult., and a number of them have already been commenced. This work was let, to equalise the time of completion of that portion of the line east of the Southern Turnpike, and, if followed as proposed, by the letting of the remainder of the Division at the time stated, the whole road can be completed early in 1852.

Extracts from the Report of the Superintendent of Transportation.

RECEIPTS AND EXPENDITURES.

Receipts from passengers over Pennsylvania Railroad in September,		$5,998·03
Receipts from passengers from Dillersville to Lewistown, in October,	$12,636·87	
Deduct proportion of receipts on Harrisburg and Lancaster Railroad,	4,835·70	
Received from passengers over Pennsylvania Railroad,		7,801·17
Receipts for eastward through freight,	538·42	
" " way "	10·49	
" westward through "	444·01	
" " way "	10·64	
		1,003·56
Total receipts on Pennsylvania Railroad for September and October,		14,802·76
Total expenses " " " "		3,405·37
Excess of receipts over expenses,		$11,397·39

CAPITAL STOCK.

Graduation.		
Cost of 60¾ miles from Harrisburg to Lewistown,	$775,000	
Present cost of superstructure,	580,000	
		$1,355,000
Real Estate.		
Damages and buildings,		85,000
Equipment.		
Passenger and freight cars,	12,500	
Engines,	11,500	
Shop, machinery, tools, &c.,	6,000	
		30,000
Interest allowed on Stock paid in,		110,000
Total cost of road and equipment,		$1,580,000

From the preceding statements it appears that the excess of receipts over expenses, during the two months the road has been in operation, is $11,397·39, equivalent to an average of 4½ per cent. per annum, on the cost of road and equipment after paying all expenses.

The per centage for the month of September has been 3⅛.
" " October, " 5⅛.

When it is considered that the road is in operation only to Lewistown, a point at which it was not expected that the receipts would more than pay expenses, and that the business of transporting freight can scarcely be said to have commenced, the results thus far must be regarded as very encouraging.

Extract from the Second Annual Report of the Directors of the Ohio and Pennsylvania Railroad Company to the Stockholders, Jan. 10, 1850.

The amount of capital stock, though yet inadequate to the entire completion of the whole, was, however, deemed fully sufficient to authorize the Board in placing a large portion of the work under contract, which has accordingly been done from the mouth of Beaver to the Ohio State line, a distance of twenty-three miles; from a point near the intersection of the Cleveland and Wellsville road to Massillon, twenty-two miles, and five miles of the only difficult part of the route, near and eastward of the town of Wooster, an aggregate of fifty miles.

The line from Pittsburg to Big Beaver, 25 miles, is now nearly prepared for letting, and it is designed by the Board to place it under contract in season to commence work early in the Spring, and prepare it for the track within twelve months from the commencement of the work, together with the division from Beaver to the State line.

The subscriptions in Columbiana county yet fall short of the sum which the Board deem necessary to authorize it in placing the work in that county under contract; the assurances, however, recently given on that subject, justify the conclusion that the subscription will speedily reach the required sum, and that portion of the work proceed simultaneously with the Ohio river line, and closing the contracts continuously from Pittsburg to Massillon. Beyond that point, to the five miles letting near Wooster, hereto-

fore adverted to, the character of the work is so favorable that it can be readily completed in a very short period; true economy, therefore, would dictate a brief suspension of that interval of the road until the heavy jobs, near Wooster, have been for some months in progress, all of which can be completed simultaneously with the Eastern Division.

The contractors commenced work about the 1st of September last, and have been steadily prosecuting their respective contracts, several of which are nearly completed, and the whole line from Pittsburg to Wooster, 130 miles, may be prepared for the rails by the Spring of next year, notwithstanding, on one or two sections near the mouth of Beaver, the work has been suspended in consequence of the exorbitant demands for damages for the right of way. These obstacles will speedily be removed, either by compromise or legal adjudication, in season to recommence on the sections referred to early in the Spring, and completed simultaneously with that portion of the road now progressing. In the mean time the Company has sustained no loss by delay; on the contrary, it will be largely the gainer by the suspension, inasmuch as the most moderate computation of damages demanded for the roadway through section 25, at Beaver, would have amounted to $17,000 or $18,000, for which the owners are now willing, we understand, to take between $4000 and $5000.

You will have perceived, from the preceding remarks, that it is the design of your Board, should no unforseen obstacles arise, to place under contract the whole line not heretofore let, between Pittsburg and Wooster, at a very early day, and prepare the road-bed for the rails, which it is believed, with adequate means, may all be accomplished within the present year, with the exception of a few heavy contracts to be completed in the following Spring. If the requisite funds are provided with sufficient promptitude, it is the opinion of the Chief Engineer that the whole line can be in use, and the trains running to Wooster in the autumn of 1851.

Where the undulations of the country require the line to deviate from a level, the grades in all cases are less than 50 feet to the mile, and there is no curve of a less radius than 1000 feet. From Wooster westward, by Loudonville and Mansfield, to the intersection with the Cleveland, Columbus, and Cincinnati Railroad, and the proposed point of junction with the Bellefontaine and Indiana Railroad, the distance will be about 50 miles, requiring no grade exceeding 26 feet per mile.

Extracts from the Annual Report of the President and Managers of the Beaver Meadow Railroad and Coal Co. to the Stockholders, Jan. 21, 1850.

The mines of the Company have been worked the past year under contracts entered into with Hamberger & Co., and Cool & Lockhart, as mentioned in the last Annual Report. They have produced upwards of 74,000 tons of coal, which have been sent over the Company's road to Shipping Port, and sold at satisfactory prices.

The transporting power of the Company, consisting of 5 locomotive engines and 297 cars, was, by the terms of the contract with Wm. Milnes & Co., mentioned in the last report, placed in their possession to transport

the coal of the Company and the product of the Summit mines, of which they are the lessees, to Shipping Port.

Extract from the Engineer's Report.

The general character and working arrangements of the road are such, that, for convenience sake, I will allude to it in this report in three principal divisions, viz: the "Upper Division," extending from the mines to Weatherly, at the foot of the inclined planes, a distance of about six miles. The "Middle Division," extending from Weatherly to the Lehigh at Penn Haven, about five miles; and the "Lower Division," extending from Penn Haven to Mauch Chunk, about nine miles,—in all twenty miles.

Extract from Report of Secretary and Superintendent.

The amount of coal transported over the road is—

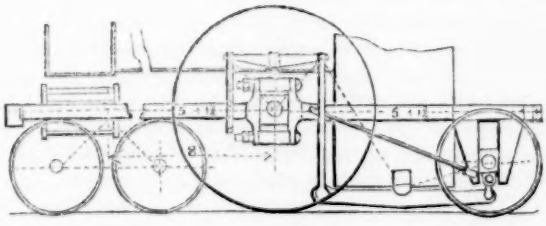
From Beaver Meadow,	73,702	
Spring Mountain,	102,220	
Hazleton Co.,	97,675	
Cranberry,	40,498	
Diamond Co.,	9,953	
		324,048 tons.
Being an increase over 1848, of	57,860	tons.
" " " 1847, of	76,548	"
" " " 1846, of	129,668	"
" " " 1845, of	175,048	"

Amount of tolls received from Spring Mountain, Hazleton, Cranberry, and Diamond Co's.	$40,429·84
Received from sales of old iron, rope, and fines,	630·42
Gross receipt from Railroad,	41,060·26
Amount expended on "	23,254·24
Gain on Railroad,	$17,806·02

*American Engineering—Locomotives.**

(Continued from page 155.)

We now give the sketch of the locomotive engine frame, referred to last month at page 154, as fig. 3. The dotted lines represent the manner in which the engine is balanced on its frame when only one pair of drivers



3-16th = 1 foot.

is used. The author of the article referred to states, that the engine from which the drawing was made works remarkably well, being quite steady

* From the Glasgow Practical Mechanic's Journal, for February, 1850.

and free from oscillation at a speed of 40 miles an hour, through curves which an English engineer would hardly like to pass through at a much slower rate. The details of construction will be readily understood on referring back to the remarks upon it in the March number.

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*Dunn's Improved Mode of Removing Railway Carriages from one Line to Another.**

Railway turntables, for removing a carriage from one line of rails to another, are very expensive to lay down, very costly, and very apt to get out of repair; so that the wear and tear, as well as the first cost, is great. Mr. T. Dunn, of the Windsor Bridge Iron Works, Salford, has invented and patented an improved mode of effecting this removal, which dispenses with the circular disks or turntables, and works without turning the carriage at all.

At the point where carriages are required to be transferred from one line of rails to another, there is a grooved tramrail across the lines, and upon a level with them, upon which a sort of cradle traverses on four small wheels or runners. This is the patent traverser, which is usually from 12 to 15 feet in length, so as to receive a carriage of any ordinary length. Its sides would form two parallel rails, in continuation of the permanent ones on the line, but they are 2½ inches above the level of the permanent rails. To each line of rails required is placed a lever, which, worked by hand, raises the adjacent length of both rails, at the end next the tramrail to the level of the traverser; so that this length of rail has thus given to it a temporary incline of 2½ inches in 12 or 15 feet, a very easy gradient, and if by any accident the rail were left so, a train coming either way would be in no danger of being thrown off the line.

When the carriage, having ascended the slight incline, is placed on the traverser, it is there fastened by two buttons, and is then easily pushed along over the tramrails, crossing the rails at right angles, till it reaches the line upon which it is to be placed. The lever raises the rails here, the unfastened carriage descends the incline, and thus, without loss of time or change of direction, the carriage can be removed from any line to any other parallel line at a station.

The patentee states that the advantages of the patent traversers over those in ordinary use are, that there is no expensive gear attached, and they are not liable to get out of order; they are easily cleaned and oiled; the foundations are formed upon the simplest sleepers; the cross tramrails are upon a level with the permanent rails, leaving no break or recess whatever, and the roads are as firm and steady as the general line. The whole of the gear is simple, strong, and inexpensive, compared with others, and leaving considerable more room in a station than turntables, and at a saving of from 200 to 300 per cent. over turntables;—in some cases, of still more amount.

We understand that one of these trucks is now working ten lines of rails at the Peterborough station of the Eastern Counties Railway; another at the Salford station, Manchester; and one is working nine lines of rail on

* From the London Mining Journal.

the Paris and Lyons Railway. It has also been introduced at many smaller stations throughout the country; and the engineer and directors of the Lancashire and Yorkshire Railway Company have recently decided to work the chief stations at Liverpool and Bradford by two traversers, (each working four lines of road,) in preference to all other plans submitted. As the plan combines real improvement with great simplicity and a considerable saving, we think the subject of sufficient importance to give it all publicity. We believe the ingenious patentee means to exhibit a large model of his apparatus, with rails, carriage, &c., at the Exhibition of the World's Industry, in London, 1851.

Extracts from the Report of the President and Managers of the Philadelphia and Reading Railroad Company, and also a Report by David A. Neal, January 14, 1850.

RECEIPTS FOR THE YEAR.

Travel, 95,577 passengers, equal to 49,097 through passengers,	$155,908·18
Freight, 51,204 tons merchandise,	106,346·86
" 1097,761 19-20 tons coal,	1,648,900·46
United States Mail,	9,400·00
Miscellaneous receipts,	5,601·47
Hauling Cars and Valley Passenger Train to June 30th,	7,433·62
Total receipts,	$1,933,590·59

The Road and its equipment are now equal to a business of 1,400,000 tons, (being an increase of 300,000 tons over that of the past year,) and no augmentation of the capital would be required for the transportation of that tonnage.

Business of the Road for the Year ending November 30, 1849.

TONNAGE.

Coal transported, tons of 2240 lbs.,	1,097,762
Merchandize transported, tons of 2000 lbs.,	51,204
Materials for use of Road, including earth, gravel, timber, rails, sills, cord-wood, stone, brick, iron, &c., &c., in tons of 2000 lbs.,	145,503
Total tonnage for the year, including weight of passengers, in tons of 2000 lbs.	1,429,564
Total amount of Coal transported to date, tons of 2240 lbs.,	6,387,445
Total tonnage of Road to date, tons of 2000 lbs.,	8,474,532

PASSENGER TRAVEL.

Total number of passengers during the year,	95,577
Total number of miles traveled by the same,	4,516,968
Equal to, in through passengers, over whole length of road,	49,097
Total number of passengers transported to date,	850,713

RECEIPTS OF ROAD.

From freight and tolls on coal,	$1,648,900·46
" freight on merchandize,	106,346·86
" passenger travel,	155,908·18
" transportation of U. S. Mail, express car, and other sources,	15,001·47
Total receipts,	$1,926,156·97

Division of Expenses of Transportation Department for the Year ending Nov. 30, 1849.

Transportation of 1,097,762 tons of coal from coal region to Richmond, junction with State Road, and other points, at 43·62 cents per ton,	$478,843·78
Expenses of transportation between junction with State Road and Company's Depôt in Philadelphia, including tolls paid State Road and City, hauling across Schuylkill Bridge, pay of Agents, &c.,	38,457·59
Transportation of 51,204 tons merchandize between Pottsville, Reading, and other points, and junction with State Road, at 82·4 cents per ton,	42,192·10
Transportation of 49,097 through passengers, between Pottsville and junction with State Road, at 66·5 cents per passenger,	32,649·50
Amount paid Contractors for passenger travel, from Dec. 1, '48, to April 30, '49,	7,881·39
Superintendence, including salaries of all officers, clerks, and coal agents at depôts,	22,168·07
Net expenses of delivering and sorting coal cars at Richmond wharves, between Trenton Railroad crossing and river Delaware,	7,778·48
Wages of all watchmen at wharves, depôts, and switches,	7,001·03
Expenses of delivering coal and freight, and hauling cars for all purposes at Reading and other depôts,	5,934·50
Office expenses, stationery, newspapers, advertising, &c.,	4,658·51
Expenses of sorting coal cars at Schuylkill Haven, for cars used on West Branch road,	7,587·58
Rent and expenses of Magnetic Telegraph,	2,564·23
Salaries of agents, and engine expenses on lateral railroads in the coal region,	2,467·98
Sundry expenses, express engines, rents, &c.,	6,771·97
Total,	$666,956·71

Number of Engines, Cars, and Running Machinery upon the Road, November 30, 1849.

LOCOMOTIVE ENGINES.	
First class engines,	50
Second class do.	25
Third class do.	8
Fourth class do.	3
Total,	86

COAL CARS.	
8-wheeled iron coal car,	1
4-wheeled do. do.	3019
Do. wooden do.	1603
Total,	*4623

CARS FOR FREIGHT AND GENERAL USE.	
8-wheeled covered house cars,	16
Do. box cars,	43
Do. open platform cars,	53
4-wheeled covered house cars,	128
Do. open platform and box cars,	223
Total,	463

PASSENGER CARS.	
8-wheeled passenger cars,	21
4-wheeled do. do.	1
8-wheeled baggage do.	5
4-wheeled do. do.	1
Do. express do.	2
Total,	30

In addition to the above, the Company own:—
2 Small Passenger Cars, for use of road.
9 Stationary Engines, from 8 to 35 horse power, for driving machinery.
10 Steam and Water Power Engines, for pumping at water stations, sawing wood, &c.
3 Portable Wood Cutting Steam Engines, at Port Carbon, Port Clinton, and Richmond.
7 Snow Ploughs.
15 Carts and Wagons, for hauling wood, &c., at Richmond and elsewhere.
37 Horses, for hauling in Philadelphia and Richmond.

Condensed Table Showing the Condition and Employment of all the Engines owned by the Company.

How Employed.	1st class.	2d class.	3d class.	4th class.	Total.
In daily use, in good order, on Reading or Lateral Roads,	32	16	3	2	53
In workshops, under repairs,	12	4	0	0	16
In good order, ready for use,	6	5	5	1	17
Totals,	50	25	8	3	86

Total number of miles run by all engines owned and used by the Company, from May, 1838, to November 30, 1849,	6,676,301
Total number of tons hauled between same dates,	1,477,480,185

* 17 Wood Cars were altered into Coal Cars during the year.

EXTRACT FROM DAVID A. NEAL'S REPORT.

The Road extends from the edge of the coal formation in Schuylkill county, at Mount Carbon, one mile south of Pottsville, to the tide waters of the Delaware at Richmond, 3½ miles above Philadelphia, and 104½ from the sea.

It is composed of 51 planes,

18 of	39 miles	length--level.		
3	$6\frac{7}{10}$ "	"	descending	1— 5 ft. per mile.
14	22 "	"	"	5—10 "
6	$3\frac{4}{10}$ "	"	"	10—15 "
7	$15\frac{2}{10}$ "	"	"	15—20 "
3	4 "	"	"	20—$42\frac{7}{10}$ "

From the Schuylkill to the Delaware,

$3\frac{1}{10}$ miles length—ascending 33½ "

From Mount Carbon to the Falls is 87 miles, total fall 549 feet. Between the Falls and Richmond, $6\frac{4}{10}$ miles, there is a rise of 61 and a fall of 104 feet. Total fall from Mount Carbon 592 feet. The Road has a double track its whole length, but only four feet apart, and of sideings and branch track to coal yards, $26\frac{20}{5280}$ miles, independent of $7\frac{44}{5280}$ miles of track over the wharves at Richmond.

The rails in use are of 45, 52, 53, and 60 lbs. to the yard, being 3856 tons (54½ miles) of 45 lbs., which have been down 12 years; 3317 tons, or 11 miles, of 52 lbs. have been down 8 years; 777 tons, or 9½ miles, of 53 lbs., 7 years, and 7992 tons, or 85 miles, of 60 lbs , from 1 to 6 years.

There are three tunnels of 962, 1600, and 1934 feet, excavated through solid rock, and arched for security from falling stone; and one under the Norristown Railroad of 172 feet.

On its whole length there are 18 stone, 9 iron, and 17 wooden bridges, over road, ravines, and water;—total length 8016 feet, of which 3693 feet are stone, 367 iron, and 3956 wood.

The others being permanent and requiring no repairs, the latter will be the only subjects of extraordinary expense. The bridge at Phœnixville, being new, will not require to be replaced for some years. The rest may probably be rebuilt from the fund provided for renewals, within the next six or seven years, of stone or wood, as may be deemed most expedient, without taking what may be required for other purposes.

The Reading Road connects directly with four lateral coal roads, to wit, at Mount Carbon, with the Mount Carbon Railroad, and the Mount Carbon and Port Carbon Railroad; at Schuylkill Haven with the Mine Hill or West Branch; and at Port Clinton with the Little Schuylkill. It also joins the Norristown Railroad at Corshehocken, and the State Road at the Falls,—the first 14 and the latter 4 miles from Philadelphia, and is thereby connected with that city. Indirectly it has other and very important connexions. The Mount Carbon Road runs 3½ miles, and then makes out in two branches, 2¼ miles each. This road is operated by animal power, and communicates with the extensive works of the Delaware Coal Co., and four or five other mines, from which were received this year 132,769 tons of coal. It also discharged into canal boats, at Mount Carbon, 73,756 tons the past season.

The Mount Carbon and Port Carbon Railroad is only 2½ miles in length. It has no mines of any consequence on its route, but is joined at Palo Alto by the Mill Creek Railroad, which continues 4½ miles to St. Clair, and has two branches of 1½ miles each, accommodating numerous collieries. It also connects with the Schuylkill Valley (or the Valley) Road, which is 9 miles in length to Tuscarora, and has 9 miles of branches to various mines. The motive power on these roads is furnished by the Reading Railroad, for which they now charge ¾ of a cent per mile, formerly ½ cent. The Mount Carbon and Port Carbon Railroad is operated by the Reading Railroad by contract. A large distributing station at Palo Alto has about 3½ miles of sideing for this purpose, and facilities for weighing the coal. There are, also, a large engine house and commodious repair shops, which are for the use of the Reading Railroad.

The Reading Railroad received this year 140,672 tons of coal from the Mill Creek, and 192,566 from the Valley Road; and the canal has received from the same sources 103,945 and 111,845 tons respectively.

The Mine Hill or West Branch Railroad extends up the Valley 10¼ miles from Schuylkill Haven, which is 4 miles below Pottsville. This road has several branches, altogether 20 miles of track, and supplied to the railroad alone, in 1849, 483,536 tons, and to the canal, 135,262 tons.

At Port Clinton, 14 miles from Pottsville, and at the junction of the Schuylkill and Little Schuylkill Rivers, the Little Schuylkill Railroad comes in from Tamaqua, 20 miles, and with 4 miles of branches, supplying the Reading Railroad with 132,087 tons, and the canal with 36,563 tons, the past year.

Stations.—There are 33 stations on the road for the various accommodations and supplies required by the passenger, freight, and coal trains, besides the extensive one at Port Carbon, and the establishment in Broad street, Philadelphia.

Of these stations, the most important are Port Carbon, Mount Carbon, Schuylkill Haven, and Port Clinton, as receiving depôts for coal; Reading and Pottstown as the sites of extensive repair shops; and Richmond as the great shipping point for all the coal not taken by the way and Philadelphia trade. All the rest are used either for passengers, freight, or wood and water depôts for the several trains. The larger ones are each under the direction of an agent, who does all the work by contract,—a system that has been introduced the past year, and which, it is believed, will be productive of considerable saving as soon as its details become well understood.

The station at Port Carbon has very extensive sideings for the distribution of the coal cars for the Mill Creek and Valley Roads, there being laid down for this purpose over 3½ miles of track. At Mount Carbon, the Company's grounds are extremely limited, but as the trains, except from the Pottsville Road, are made up at Port Carbon, there is less difficulty in making the arrangements than might be supposed. At Schuylkill Haven and Port Clinton, there are also sideings for making up the trains, but not so extensive as the business sometimes requires. At the former place, particularly, it is supposed a considerable annual saving could be made by a mile or two more of track.

At Reading, the Company owns a large tract (28 acres) of ground, a

short distance from the town, on which they have a convenient freight house. In the south part of the town they have five acres more, on which are their manufacturing and repair shops. These are necessarily on a large scale, but nevertheless inadequate to do the work in the best manner. The buildings have been put up at different times, and their locations are inconvenient, both in regard to each other and the work to be done in them. They have been much crowded with machinery, but are now better arranged than at the commencement of the year. These shops contain every species of machine used in the manufacture and repair of locomotives and cars,—some of it very ingenious, useful, and perfect of its kind. That latterly introduced for the sawing, planing, and mortising of wood, will reduce very materially the expense of making and repairing the wooden coal cars, and, with some improvements lately adopted in their construction, make them preferable hereafter, on the score of economy, to those of iron. There are now employed in these shops, in the repair of engines and cars, about 350 men and 30 boys, against 376 men and 30 boys last year.

Trip Hammer Shop.—This establishment, including building, machinery, engine, three steam hammers, and furnaces, cost $17,128·45. The policy of this outlay, at a time when every dollar expended cost the Company, in discount, commissions, or extra interest, nearly two, was at least questionable. But, being finished, it is put to good use in converting the old materials that are turned in at better prices than could be otherwise realized, into shafts, axles, tyres, and bar iron, for the use of the road and machinery, and which, at current rates, would seem to show a profit to the Company. It is possible that this establishment could be leased on terms that would make it still more advantageous.

The Foundry, including building, 2 cupolas, fans, power, cranes, &c., cost $4708, and must be considered a profitable establishment, if the car wheels and other castings made here prove, as they now appear to be, good. It saves all scrap castings, or rather receives them at one cent per pound, and turns out chilled tender and car wheels, and other articles of cast iron, at about $1\frac{6}{0}$ cents per pound, being a saving of nearly one-half over purchasing them in the market. The adoption of a new process in casting spoke wheels, by which they are made with solid hubs, will also save a large sum in fitting them.

At Pottstown are the principal shops for the repairs of the track and bridges, and an extensive building for housing cars, &c.

At Richmond there is a large engine house and machine shop for common repairs. This is also the shipping point for all coal going by sea or canal from the railroad.

There are 14 wharves, capable of holding 120,000 tons of coal, and having berths for 90 sail of vessels, which may all be loading at one time, either by means of shutes or barrows.

The distribution of these wharves among the several dealers and operators has been, and may continue to be, a matter of great consideration and difficulty. Heretofore no charge has been made for the use of them. They are covered by a platform supported by trestle work, on which are laid the rails for the coal cars that are placed there by engines devoted to that duty. They deposit their loads either by *dumping* them upon the wharf below or through shutes into the holds of vessels. No more complete es-

tablishment can be imagined. It is capable of shipping, with good management on the part of the holders of the wharves, at least 1,500,000 tons, and the Company own enough of water front here to build six more wharves, that would bring up the capacity to 2,500,000 tons. The most that has been shipped is 838,000 tons, but 956,000 have been received there in one year.

The number of men employed in the above workshops has been reduced from 711 in June, 1848, to 493 in November, 1849, and their monthly wages from $22,191 to $15,600.

The relations of the Reading with the lateral roads are of the most friendly character. With the Mount Carbon and Port Carbon there is an existing contract which expires next May, by which the Reading Railroad Company have the use of the tracks, engine house, machine shop, weighing apparatus, and office, for which they pay the sum of $10,000 per annum, and, in addition, operate the road, which is kept in repair by the Mount Carbon and Port Carbon Railroad Company. The Valley and the Mill Creek are also worked by the Reading—formerly at ½, and since April last at ¾ of a cent per ton per mile. This is probably about the actual expense.

The Reading Railroad supplies cars for all the coal brought upon their road from the lateral roads without charge. The Canal Company do the same. This carries a heavy expense, which is included in the account of repairs of coal cars, though it does not properly belong to the cost of working the Reading Road.

The Report of the Engineer shows precisely the engines and cars used on the road, and their present state, the amount of transportation, the cost of operating the road, and the net results.

It will be seen that 1,047,000 miles were run by engines passing about 1,100,000 tons of coal, 50,000 passengers, and 50,000 tons of merchandize, producing a gross income of nearly two millions of dollars, and requiring an expenditure of about half that amount, thus showing the magnitude of its business and the necessity of continual watchfulness over it.

The charge for the use of the State Road from the Falls to Broad street, in Philadelphia, amounts to $27,000 annually, while, from the nature of the accommodation, little or no saving is effected in its transportation. As the State is about to abandon the use of this part of the road, it may, perhaps, be obtained for a reasonable consideration. If not, the City business may be abandoned to the canal, which could well afford to offer for it some other equivalent.

The State demands a tax on dividends of 5 per cent., when the dividends amount to 6 per cent. on the capital, otherwise a tax on the road.

But the great drain, it is hoped, has ceased. Enormous rates of interest, bonds sold at half their nominal value, commissions, brokerages, and similar charges, ought to be no more heard of forever in the annals of the Reading Railroad.

But the road, *i. e.* the bridges, the rails, the engines, and the cars, must be perpetuated, and that has been provided for by a Renewal Fund that will effect its object. For a few years, till the wooden bridges can be replaced with stone, it may all be consumed within the year. Beyond seven years, it will be a constantly increasing fund. The bridges being all of a

permanent material, the present charge for sustaining and watching them will be dispensed with, thereby diminishing by so much the current expenditure.

This railroad derives its resources from the coal fields of Schuylkill county, which now send to market more than all the other anthracite regions put together, and are capable of producing much more than there is likely to be any market for for many years, if not ages, to come. The supply there is limited only by the demand—the demand will be regulated by the relative facilities in the different regions for working the mines and conveying the coal to market. The anthracite coal capable of being worked is found in this country only in the State of Pennsylvania. The Lehigh region affords the hardest, and, for many purposes, the best. Its outlet is through the Lehigh canal and river 60 miles to Easton, thence through the Delaware division of the Pennsylvania canals to Bristol, 60 more, thence by the Delaware to Bordentown, 10 miles, then by the Delaware and Raritan Canal, 43 miles to New Brunswick, whence it is taken to New York, 29 miles.

Instead, however, of passing the Delaware division, it may pass the Delaware at Easton, to the Morris Canal, and by that canal 90 miles to Jersey City. On this route it is restricted, too, by the size of the boats, and still more by the unfinished state of the inclined planes, by which these boats are carried from one level to another, instead of locks. The boats on this canal are of 70 tons burthen, but the planes will not allow their passage with more than 50 at present. The Lehigh Canal sent forward by the above routes, in 1848, 680,193, and in 1849, 800,197 tons of coal. The cost of transportation to New York, including tolls, is about $2·40 per ton. The coal fields of the Lehigh connect with those of the Schuylkill at Tamaqua, near which place is the dividing summit between the Delaware and Schuylkill rivers. From this point, it is said, tolerable grades may be found for a railroad along the valley of the Mahanoy and Lehigh to Easton, 60 miles. It would, however, come in competition with the Lehigh Navigation, which is capable of doing the whole business of that region, and it must, of course, be up-hill work to take the trade of the Schuylkill Valley. Between Easton and Somerville, an elevation of about 600 feet is to be overcome, and nothing better than 22 feet grades against the down trade can be anticipated. It is evident that a vast outlay will be required for such a work, and if it were made, it is quite doubtful whether it will affect the Reading Railroad unfavorably or otherwise. A sufficiently healthy competition may be maintained by enlarging the canals already in use, and by the facilities of mining enjoyed by the powerful companies operating in this district.

The Lackawana region lies north of the Lehigh, and has its only outlet by means of the Delaware and Hudson Canal at Honesdale, to the Hudson river at Rondout, 109 miles, where is the established depôt. Thence to New York it is transported by the Company, at a freight of 50 cents per ton. The cost of transportation on this route is merged in the price of the coal, which is fixed annually by the Delaware and Hudson Canal Co. The receipts at tide water of this description, this year, have been 454,240 tons against 434,267 tons in 1848. The canal, which will only admit

boats of 50 tons, will be enlarged, and the supply from this region will undoubtedly increase.

The coal of the Schuylkill has two outlets, in the Railroad and the Schuylkill Navigation. By the former, the freight and tolls to tide water at Richmond have averaged, the past year, about 30 cents per ton more than by the latter to the wharves on the Schuylkill. The difference is esteemed to be a fair compensation for the superior advantages of the former over the latter mode of conveyance. Such are the only sources of supply for this particular description of coal, with the exception of some small quantities that reach the Susquehanna from the Wyoming, Pine Grove, Shamokin, and Lykens Valley mines. The mines in the Schuylkill Valley can deliver coal at Mount Carbon at $1·25 to $1·50 per ton; freight per railroad $1·50 to $1·80; its cost at tide water from $2·75 to $3·30.

But the anthracite is liable to competition from other descriptions, both domestic and foreign—more especially from the Cumberland and Susquehanna of the former, and the Pictou and Sidney of the latter character. The Cumberland and Susquehanna can probably be delivered at tide water at about $3 to $3·50 per ton, but at points whence freight by sea will be higher than from New York or Philadelphia.

The cost of the road stands at an alarming figure—over sixteen millions for less than one hundred miles of railroad is enough to deter many from investing, even at a great discount. It is still more to be feared, if this sum has been expended, not in making the road, but in raising the means to make it. Nevertheless there is another view of this matter. The facilities of its easy and uniform grades, that are not to be found on any other road of equal length, the advantages of its location, occupying, as it does, all the available space in the valley it passes through, and the abundance of its resources for business that can never fail, and may be extended at pleasure, are perhaps a full equivalent, though they are no reasons, for this large expenditure. Its ability of transporting great masses with comparatively little power is one that cannot be bought with money. The Reading, it is believed, does carry over it a larger amount of tonnage than any other existing railroad, and at less expense. It is probably destined to form part of the communication between Philadelphia and the great Lakes, if not with the West, and it affords at all seasons the means of furnishing supplies to the large population of a very fertile and wealthy country on the banks of the Schuylkill, and in the coal regions beyond. It will have rivals. There will be rival producers and rival carriers. The cost of working and the rates of leave for taking coal must be, if they have not already been, brought down to a point that will be an average of other business. Coal lands are of no value if they are not operated. Their owners will take half a loaf rather than no bread. The mines that are expensive will be dropped, and those only in favorable locations continue to be worked. These will be found in all the coal regions, and will tend to reduce the price of coal to the consumer, and thereby increase the consumption. This is not a competition that the transporters need fear. It is not great prices but great quantities that such railroads as the Reading want. The chance of a great rivalry is less probable among the carriers. Great avenues can be constructed, as experience shows, only at enormous outlays and with doubtful results. The Corporations that have constructed

them heretofore have all become bankrupt, and there would seem to be no inducement for seeking the same end by the same means. Insane speculators there always will be, but they seldom take a beaten path to ruin. They have too much self-esteem to follow others.

AMERICAN PATENTS.

List of American Patents which issued in September, 1849, *with Exemplifications by* CHARLES M. KELLER, *late Chief Examiner of Patents in the U. S. Patent Office.*

Continued from page 180.

26. For an *Improvement in Atmospheric Churn Dashers;* William M. Wright, Pittsburg, Pennsylvania, September 11.

The patentee says,—"My invention consists in constructing a hand-dasher in such a manner that it will operate as an air pump, to force a stream of air into the cream at the same time that it agitates it, while being raised and lowered in the act of pumping."

Claim.—"What I claim as my invention, is the combination of the loose plunger with the tubular dasher, the same being made, arranged, and operated as set forth, or in any other substantially similar manner."

27. For an *Improvement in Cars for Dumping Earth, &c.;* Michael Berney, Syracuse, Onondaga county, New York, September 11.

The patentee says,—"The nature of my invention consists in providing dumping cars with rockers and clevices, in such a manner that the bodies of the cars may be easily overturned, and their contents discharged, and at the same time allowing the body to be placed upon the frame at a less distance from the ground than in earth cars heretofore in use."

Claim.—"What I claim as my invention, is the combination of the rocker and clevices with the double car body, substantially as described, and for the purpose set forth."

28. For an *Improvement in Horse Powers;* William Ward, Zanesville, Muskingum county, Ohio, September 11.

The patentee says,—"The nature of my improvements consists especially in the arrangement and combination of a rotary compound accelerative wheel with its hollow shaft and pinion, by which the power and motion of the master wheel is communicated directly to the pinion of the line shaft from two points diametrically opposite, and independent of, each other."

Claim.—"What I claim as my invention, is the combination of the compound wheel with the pinions N N, and beveled cog wheels R R; cogged wheel H with the propelling pinions F I, the pinion Q of the line shaft P, and driving or master wheel A; the whole arranged and operated in the manner set forth."

29. For an *Improvement in Pumps for Raising Water;* John B. Read, Tuscaloosa, Tuscaloosa county, Alabama, September 11.

The patentee says,—"My improvements consist in forming the upper part of the pump chamber of a trumpet-shape, so that the piston, when raised somewhat higher than its usual working limit, may enter this enlarged part of the pump chamber, and be sufficiently loose therein to allow any water above it to pass freely below it or on its outside; also in attaching the lower valve, which is to be spherical, to the lower part of the piston by some flexible connexion, as a small metallic chain; the chain to be of such a length that the lower valve may be raised from its seat whenever the piston is elevated into the enlarged part of the pump chamber, as mentioned above; thus allowing a free passage into the well for any water above the piston, and affording the means of withdrawing the lower valve from the pump, along with the piston, and the upper valve attached to the piston in any of the ordinary modes, whenever it may be necessary for repairs or any other purpose."

Claim.—"What I claim as my invention, and as an improvement in atmospheric and lifting pumps, is the connexion of the lower valve with the piston, in combination with the trumpet-shape of the upper part of the pump chamber, so that, when the piston is elevated

higher than usual, the water above the piston may return into the well, and the piston rod and both valves be withdrawn from the pump and replaced together when necessary, as described."

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30. For an *Improvement in Cooking Ranges;* Philip Rollhaus, City of New York, September 11.

The patentee says,—"The nature of this invention and improvement consists in arranging the ovens of the range on either side of the fire chamber, and providing the same with inclined diving flues at their sides, and inclined ascending flues at their back parts, communicating at their lower ends with horizontal flues beneath the ovens, in such a manner as to conduct the heat over the tops, down the sides, below the ovens, and up behind their back parts; said flues being inclined in such relation to each other as to partially break the draft or current of the heat and smoke in its route, and cause it to enlarge its volume beneath the ovens; and also in arranging diagonal plates and dampers above the ovens, for causing the heat to pass directly from the fire chamber into the chimney when desired."

Claim.—"What I claim as my invention, is the arrangement of the inclined flues at the sides of the ovens, and inclined flues at the back parts of the same, in combination with the diagonal plates, and the dampers, for either causing the heat to pass directly from the fire chamber into the chimney, or over the tops, and down the sides, and, after enlarging its volume below, up behind the ovens, as set forth."

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31. For *Improvements in Machines for Dressing Shingles;* Franklin Jenney, New Bedford, Bristol county, Massachusetts, September 18.

Claim.—"What I claim as my invention, is the combination of the following elements: 1st, the inferior or stationary inclined bed; 2d, the elevator; 3d, the stationary plane or knife F; 4th, the pressure roller N; 5th, the movable carriage and its ways; 6th, the superior or reversed inclined bed, having an angular inclination to a horizontal plane of double that of the stationary bed; 7th, the plane or knife G; 8th, the spring catch-bar; 9th, the pressure roller R; the whole being arranged and made to operate together substantially in the manner as specified."

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32. For an *Improved Machine for Making Brooms;* James Thomas, West Chester, Chester county, Pennsylvania, September 18.

The patentee says,—"My invention consists of three separate sets of gripes or lever presses, which act independently of each other, and by which the handle is firmly supported, and the brush pressed and securely held upon the handle during the operation of winding the wire which binds the brush to the handle."

Claim.—"What I claim as my invention, is the use of two or more sets of jaws, made and arranged substantially in the manner and for the purpose herein set forth, for compressing the broom brush, and holding it on the broom handle, during the process of wiring the broom."

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33. For an *Improvement in Flues for Cooking Stoves;* Henry Bleecker, Albany, New York, September 18.

The patentee says,—"The improvement in which my invention consists, is the manner in which the conveying flues are reverted into the return flue in the chamber at the front of the stove."

Claim.—"What I claim as my invention, is the reverting chamber formed by the angular plate K and plate H, under the front of the bottom of the oven, as herein set forth, when this is combined with the flues formed by the plates B and C, as described."

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34. For an *Improvement in Cooking Stoves;* William Wheeler, Troy, New York, September 18.

The patentee says,—"The nature of my invention consists in the mode of constructing the fire chamber, grate, and ash-pit, and in combining two ovens therewith, by which I can economize heat, and can cook a great variety within the ordinary space allotted to the purpose."

Claim.—"What I claim as new, is, 1st, the contracted opening in which the fire grate is situated, extending down through the bottom of the stove, in part under the grate, and permitting the ovens to be enlarged at that point through which the ashes is discharged and air

supplied for combustion, and forming a heated chamber, by which a greater heat is given to the oven quite to the bottom of the stove.

"2d, I claim the fire-arch plates, with their overhanging projections or ledges forming diagonal channels, so constructed as to prevent clogging with ashes, and admitting air on the sides, as set forth.

"3d, I claim the combination of the grate and its frame, constructed substantially as described, having an angular depression on the upper surface of the grate, and a segmental curvature on the under side, combined with the fire-arch as set forth, and with the connecting bars placed within the ends of the cross-bars of the grate to complete the draft.

"4th, The combination of the air-passage with the centre fire-arch and oven flues, substantially in the manner and for the purpose described."

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35. For an *Improvement in Cooking Stoves;* William Sours, Mount Jackson, Shenandoah county, Virginia, September 18.

The patentee says,—"The invention consists in the arrangement of the flues and their course around the oven; it is for the purpose of more equally distributing heat than has heretofore been, with a convenient mode of construction."

Claim.—"What I claim as new, is the arrangement and direction of the flue, in combination with a fire chamber the whole size of the top of the stove, the flues forming the first part of the course being made a part of the walls of said chamber."

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36. For an *Improvement in Cooking Stoves;* Elias Kane, Camden, Camden county, New Jersey, September 18.

The patentee says,—"The purposes of my invention are to cause the draft to pass directly from the fire chamber around the oven, and thence out of the exit pipe, without any return flue, the fire chamber being situated in the upper part of the stove in front, and the exit pipe in the rear end of the stove at top."

Claim.—"What I claim as new, is the combination of the flues, substantially as described, so as to cause the draft to pass around the oven the whole breadth on their sides, and thence along side flues, on top to the exit pipe, through the triangular flue in the rear.

"I also claim, in combination therewith, the fire chamber with a grated back, by which I effect an economy of heat by exposing a larger portion of the ignited fuel to the chamber over the oven."

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37. For a *Signal for Privies;* J. H. Doughty, City of New York, September 18.

The patentee says,—"The nature of my invention consists in the arrangement of a signal on a privy, in combination with a bolt for fastening the door on the inside, so that the act of fastening the door with the bolt raises the signal in a cupola on the top of the privy, and gives notice to persons outside that it is occupied."

Claim.—"I claim the combination of the signal with the bolt of the door of the privy, to operate the signal in the manner set forth, by the bolting and unbolting of the door."

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38. For an *Improved Fire Arm with several Stationary Barrels and a Revolving Hammer;* George Leonard, Jr., Shrewsbury, Worcester county, Massachusetts, September 18.

The patentee says,—"The general ideas embraced in the improvement, machine, or instrument, in combination with several connected barrels, is a lock; by the ordinary motion of a trigger, the hammer is made to revolve and give repeated strokes in proper positions to explode the charges of the several barrels; the barrels and stock of the gun, carbine, or pistol, in the mean time, are fixed and permanent; they have no motion necessarily connected with the explosion, but remain unchanged in situation."

Claim.—"What I claim as my invention, is a fire arm with the following essential elements: several fixed barrels and a revolving hammer. The successive discharge of the barrels is effected by the hammer, and the whole is constructed substantially as herein described, but irrespective of the positions of the cones, of the form or position of the hammer, or of the mechanical devices by which the revolution of the hammer is effected or the stroke given."

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39. For an *Improvement in the Land-Side of Ploughs;* Abraham Christ, Unity, Columbiana county, Ohio, September 18.

Claim.—"What I claim as new, is diminishing the bearing of the land-side upon the bottom of the furrow, and thus lessening its friction, by inclining at least one half of its lower

edge, on the rear end, slightly upwards, but not so abruptly as to prevent it from resting throughout its entire length against the land-side of the furrow, to sustain the pressure of the furrow slice against the mould-board, and maintain an equal balance of the plough."

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40. For an *Improvement in Machinery for Riving and Dressing Shingles;* Enoch R. Morrison, Angelica, Alleghany county, New York, September 18.

The patentee says,—"The nature of my invention consists in the application of a single revolving wheel furnished with knives, by which the shingle is riven and shaved, to a stationary block or case in which it is shaved and jointed; the various operations performed by the revolution of the wheel being, first, riving the bolt; second, shaving and tapering the face of the shingle; and third, jointing its edges."

Claim.—"What I claim as my invention, is effecting the several operations of riving the bolt, and shaving and jointing shingles, by a single revolving wheel, made and arranged substantially in the manner described."

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41. For an *Improvement in Rotary Churn Dashers;* Lewis W. Colver, St. Louis, Missouri, September 18.

The patentee says,—"The nature of my invention consists in giving the beaters of a churn dasher a revolving motion on their own axis."

Claim.—"What I claim as my invention, is making the beaters of revolving churn dashers to turn upon their own axes, substantially in the manner and for the purpose set forth."

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42. For an *Improvement in Rotary Churn Dashers;* D. N. Egbert, Hudson, Summit county, Ohio, September 18.

The patentee says,—"The nature of my invention consists in making the floats of the revolving dashers hollow, and fitting them with pistons to which motion is imparted by eccentrics, in such manner that the air drawn in during the ascent of the floats is forcibly ejected beneath the surface of the liquid."

Claim.—"What I claim as my invention, is the combinations of the pistons, moved by stationary eccentrics, with the floats of a revolving dasher, in the manner and for the purpose herein set forth."

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43. For *Improvements in Couplings for Cars;* Joseph D. Alvord, Springfield, Hampden county, Massachusetts, September 18.

The capacity of the machine for self-adjustment, by the laws of gravitation and the collateral aid of the spring, if necessary, in its application to railroad cars, the ease and certainty by which a separation can be produced by the lever attached, and the advantage of the immediate disconnexion that would follow, in case of an accident by which one car should be thrown off the track and down an embankment, are important improvements and principles claimed by the inventor.

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44. For an *Improvement in Gas Generators;* Albert Woodhull and Charles Minturn, City of New York, assignees of John Watson and Edward Cart, Hull, England, September 18.

The patentees say,—"The first of these improvements consists in so constructing the retort furnace that it can receive the whole charge of fuel required to generate a given quantity of gas. And also the regulating the draft of air to the fire, and the escape of heat therefrom, so that the rate at which the fuel is to be consumed will be such as to prolong the combustion over a period of time equal to that for which the gas generated by it is to be used.

"And secondly, combining the gas-holder with the pipe or channel which conveys the material for making gas to the retorts, by a throttle-valve, stop-cock, or like contrivance, so that the quantity of materials fed will be in ratio to the gas at any time used."

Claim.—"What we claim as our invention, is so constructing the retort furnace that it can receive the whole charge of fuel required for a single operation, and so managing the combustion of the fuel, by setting the controlling dampers, that it shall cover the space of time usually allotted to the consumption of the gas by the burners, when this arrangement of furnace and damper is combined with the gas-holder that controls the feed to the retort, and supplies the same according to the consumption of the burners, as set forth and described herein."

45. For *Improvements in Couplings for Cars;* H. L. B. Lewis, City of New York, September 18.

Claim.—"What I claim as my invention, is the connecting railroad cars by a joint formed by the combination of the head pieces with the cylindrical piece, the joint being held together by the link and pins; the whole constructed and arranged in the manner described."

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46. For an *Improvement in Frames for Stretching Canvas;* Henry Bryant, Hartford, Connecticut, September 25.

The patentee says,—"My improvement consists in making the frame without mortise or tenon, by simply cutting the ends of the four parts of the frame to a mitre, and bringing the parts together so as to form right angles at each corner, and securing them in that position by metallic plates, held in their proper positions by binding screws inserted through slots in each of the limbs of the plates."

Claim.—"What I claim as my invention, is the method of constructing the frame without mortise or tenon, by cutting the corners to a mitre and securing them by metallic plates, by means of binding screws inserted through slots, so that the corners may be forced outward by means of four wedges or keys, when the whole is constructed substantially as herein described."

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46. For *Improvements in the Spinning Jack;* Foster Nowell, Lowell, Middlesex county, Massachusetts, September 25.

Claim.—"What I claim as my invention, is driving the carriage spindle forward and back by means of a mangle wheel, on which the teeth are arranged in a circular position, and securing the quick and slow motion of said carriage by alternately driving the mangle shaft with gears of equal size, and with gears greater or less disproportioned to each other.

"I also claim stopping the movement of the carriage when it is out, so that the requisite twist may be put into the yarn by throwing, from time to time, the pulley (on the main shaft, and from which the mangle shaft derives its motion) out of connexion with said shaft by the clutch, operated substantially as described.

"I also claim effecting the 'backing-off' of the yarn from the spindles, or reversing the action of the race belt shaft, from time to time, by means of a suspended box or frame containing the self-adjusting stud, operated or pressed down by the revolving arm on the mangle shaft, and having a hook, which, as said box descends, engages with and turns the ratchet on said race belt shaft, the same being substantially as described.

"I also claim changing or varying the transverse movement of the copping or faller wire by the double ratchet, operated as described, the screw rod and chain connected to the shaft which holds the copping wire; the whole being combined and operating substantially as set forth."

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47. For an *Improved Door Lock;* Edwin B. Horn, Boston, Massachusetts, September 25.

Claim.—"What I claim, is one or more concentric depressing tubes, as combined with the series of tumblers and internal or permanent key, and made to operate therewith, and by means of the external key, substantially as described.

"I also claim the mode of making the internal key, viz., with the socket in the shank, and the movable bit and spring applied to the said socket; the whole being substantially in manner and for the purpose as set forth.

"I also claim the indented or concentric wheel tube, and its gear or turning mechanism, in combination with the series of (or one or more) concentric depression tubes, and its and their tumblers, substantially in manner and for the purpose as specified; the said wheel tube being constructed with one or more recesses or notches, for the reception of the projection of its tumblers, under the circumstances and for the purpose as described.

"I also claim the head or socket plate, in combination with the fixed key-shank, and the series of concentric depressing tubes, substantially as specified; the same serving to cover and protect the ends of the concentric tubes, and to lock or connect the permanent and movable keys together, so as to enable the latter to turn the former, all as explained."

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48. For an *Improvement in the Motion of Riddles in Winnowing Machines;* Alexander Moffitt, East Bethlehem, Washington county, Pennsylvania, September 25.

The patentee says,—"My invention consists in a peculiar combination of the crank, bumpers, radius-bars, and suspension-straps, whereby a combined reciprocating shocking motion

is communicated to the shoe, the shocks being produced by the striking of the shoe alternately at its top and bottom against bumpers attached to the frame of the fanning mill, by which arrangement the cleaning of the grain is more efficiently performed."

Claim.—"What I claim as my invention, is oscillating the shoe diagonally, by means of the bumper, substantially in the manner and for the purpose set forth."

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49. For an *Improvement in Paring and Coring Fruit;* Peter W. Hardwick, Wayne county, Indiana, September 25.

Claim.—"What I claim as my invention, is the projecting hollow tube core-cutter, in combination with the lever-arm, in the manner and for the purpose described."

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50. For an *Improvement in Suspender Buckles;* Sheldon S. Hartzhorn, Naugatuck, New Haven county, Connecticut, September 25.

Claim.—"What I claim as my invention, is constructing a buckle or fastener for suspenders, and other purposes, of a front plate, a spring with two eyes or places to hold the tongues or pins, and the tongues or pins made of one piece bent to the shape, substantially as shown, when the whole is arranged, connected, and combined, substantially as described."

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51. For an *Improved Form of the Air Chamber of Life Boats;* James D. Greene, Cambridge, Middlesex county, Massachusetts, September 25.

The patentee says,—"My improvement consists of a peculiar construction or extension of each of the said air chambers, whereby I am enabled, with respect to the common mode of making such air chambers, to obtain more buoyant power, and, in consequence thereof, a greater elevation of the centre of gravity of the boat above the plane or line of flotation, whenever the said boat may be thrown bottom upwards."

Claim.—"My invention, and that which I claim, consists in the peculiar enlargement or mode of making each of the decks or upper parts of the air chamber at the bow and stern, each being constructed with a reversed inclination or depression towards the nose of the bow or stern, and an elevation of base high above the gunwale, as represented in the drawings, and as differing from the mode heretofore practised, and substantially delineated on said drawings by dotted lines; the said improvement in the bow and stern air chambers enabling me to obtain advantages as above stated, as well as many others not herein enumerated."

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52. For an *Improvement in Cauls for Veneering;* Hazard Knowles, City of Washington D. C., September 25.

Claim.—"What I claim as my invention, is the method described of interposing between the veneer and the screw, or other device, by which it is compressed into contact with the surface on which it is required to glue it, a stratum of some elastic substance thick enough to be readily compressible into the cavities, and to allow the protuberances of the surface to penetrate into its mass, whereby a sufficient pressure is exerted upon every part of the veneer, bringing it into close contact with the surfaces of all the inequalities of the ground, and effectually expressing the surplus glue from between them."

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53. For an *Improvement in the Mode of Applying Springs in Timepieces;* Levi Beach, Bristol, Hartford county, Connecticut, September 25.

The patentee says,—"My improvement consists in so constructing the movement that two wheels, propelled by springs, may operate on opposite sides of the main pinion, in such a manner as to essentially reduce the friction, (which is very considerable when *one* spring, sufficient to move the work for eight days with a dead beat and lever, is used,) and so that one of the springs may be exerting its full force while the other is being wound up, thus operating as a maintaining power in the most efficient manner."

Claim.—"What I claim as my invention, is the using of two driving wheels, propelled by two springs, and so arranged as to exert their driving force on opposite sides of the main pinion, to lessen the friction, to communicate a uniform motion, and to supply a sufficient maintaining power while each spring is being wound up, for what are called 'Eight Day Marine Timepieces,' when the whole is constructed and arranged substantially as described."

54. For an *Improvement in Springs for Chairs;* Thomas E. Warren, Troy, New York, September 25.

The patentee says,—"The nature of my invention consists in the using of the plates in a reverse position from that adopted in ordinary elliptic springs, by which I am enabled to firmly affix both ends of each and every leaf of which the spring is composed, and at the same time prevent them from wearing, by entirely separating them from each other, excepting where they may be fastened, and not allowing them to slide over any rest or stationary part of the carriage or other object which they are used to sustain."

Claim.—"What I claim as new, is the employment of two or more sets of bow-shaped or other regular curved leaves, substantially such as herein described, being made of metal of the same thickness and breadth throughout, or nearly so, and firmly attached by their ends or bearings to the boxes or other fixture by which they are held in place, each leaf composing said springs working separate from the others, as above specified, and firmly fastened at their ends or bearings, as applied to chairs or other similar purposes, as described and represented."

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55. For an *Improvement in Dentists' Forceps;* Edward Bourne, New Bedford, Bristol county, Massachusetts, September 25.

The patentee says,—"The nature of my invention consists in combining flexible jaws with the forceps, attached to a fulcrum rest-bar, whereby the instrument is made and adapted to pull different sizes of teeth with great facility, in a straight direction."

Claim.—"I claim the combination of the flexible jaws with the forceps, in the manner substantially described, for the purpose set forth."

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56. For an *Improvement in Self-Acting Cheese Presses;* Samuel Mann, Alstead, Cheshire county, New Hampshire, September 25.

Claim.—"What I claim as my invention, is the employment or application of the rollers in connexion with the levers, the rollers being suspended between the follower-board and the cheese-board by means of the cords, ropes, chains, or other suitable suspenders, substantially in the manner and for the purpose set forth; thereby not merely giving pressure to the cheese, but pressing it with a gradually increasing degree of pressure, as the follower-board and the cheese-board, with the cheese between them, descend along the standards."

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57. For an *Improvement in Seed Planters;* James P. Ross, Lewisburg, Union county, Pennsylvania, September 25.

The patentee says,—"My improvements in the construction of the seed drill are, 1st, the mode of regulating the quantity of seed to be dropped; 2d, the apparatus for regulating the depth of the drills; and lastly, the method of bracing the beams to which the hollow teeth are affixed, so as to keep them steadily in place, and allow them freedom of motion to vibrate up and down."

Claim.—"What I claim as new, is, 1st, the combination of the carrying wheel and shaft, substantially as described, by means of the spur-gear and crown-wheel, with a lateral motion, by which the quantity of seed sown can be exactly regulated.

"2d, I claim the adjustable gauge for regulating the depth to which the seed shall be sown, and for the other purposes named, covering and depressing the earth over the seeds.

"3d, I claim the mode of securing the parallel motion of all the teeth laterally, by means of the diagonal braces, all as herein fully set forth."

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58. For *Improvements in Machinery for Jointing Staves;* Hosea and Lorenzo D. Benson, Jackson, Susquehanna county, Pennsylvania, September 25.

The patentees say,—"The nature of our invention consists in providing two planes with unequal faces, and coupling said planes together on a movable gate, to set the planes at different angles to one another, and in operating the said planes by a reciprocating motion, to plane the joints of staves of any bulge, and any bevel on the edge,—the one plane shaving in one direction, and the other plane shaving in the other direction, cutting both ways of the reciprocating motion; and also planing off the rough and smoothing by the construction of each plane."

Claim.—"We claim the combination of the two planes with the guide-rails and the gauge, to set the planes at different angles, to joint staves of different bulges, the planes answering the purpose of a face plate, and the one plane shaving in one direction, and the other shaving in an opposite direction, in the manner described, or in any manner substantially the same.

"We also claim the planes constructed with the faces in each plane, in combination with the supports on the planes, to shave off the rough and smooth or finish the jointing by one set of planes, in the manner substantially as set forth."

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59. For an *Improvement in Attaching Hooks and Eyes to Cards;* Charles Atwood, Birmingham, New Haven county, Connecticut, September 25.

The patentee says,—"The nature of my invention consists in fastening them by perforations through the paper, and by embossing it so as to show almost the whole form of the hook on the face of the card, and in such manner that it will not recede, not permit the eye, when appended to the hook, to escape from it."

Claim.—"What I claim as my invention, is the fastening of hooks and eyes to the cards in the manner set forth: that is, by means of suitable perforations, and crimping, folding, or doubling of the cards or paper, thereby dispensing with the use of thread and much labor."

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60. For an *Improvement in Shower Baths;* Jeremiah Essex, Bennington, Bennington county, Vermont, September 25.

The patentee says,—"The nature of my invention consists in providing an apparatus having the convenient attachments for a warm shower, cold shower, and vapor baths in one, and the whole being convenient for operation by the person using the bath, and for his changing from one to the other at pleasure; the whole being effected with very trifling cost over that of the common shower bath."

Claim.—"What I claim as of my own invention, is the manner of arranging the pump, cistern, lamp, and steam tube, as set forth, substantially in the manner and for the purpose described."

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61. For an *Improvement in Making Dissected Maps;* Samuel M'Cleary and John Pierce, Hoosick, Rensselaer county, New York, September 25.

The patentees say,—"The nature of our invention consists in forming a set of steel or other suitable metallic dies, exactly corresponding in number and form with the towns, counties, states, or whatever division it may be desirable to make in the map or chart, and the wood or paper, or other material, being fitted to a proper thickness and surface by pressure, is split or cut off with each of the dies, and these several pieces or sections, when properly arranged, will exactly fit together and form a whole or complete map or chart."

Claim.—"What we claim as our invention, is our mode of making dissected maps; the same consisting in cutting the sections with the grain of the wood by suitably prepared dies, the paper with the inscriptions and representations being pasted upon the wood before the sections are cut; all above specified and for the purposes herein mentioned."

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62. For an *Apparatus for Opening and Closing Blinds;* Cheney Reed and Elias Howe, Jr., Cambridgeport, Middlesex county, Massachusetts, September 25.

Claim.—"What we claim as our invention, is the apparatus described for opening and closing blinds from the interior of the house, without opening the sashes; said apparatus consisting of a horizontal slotted arm, fastened to, and projecting from, the blind, and a lever arm cast on, and projecting at right angles from, a sliding and turning rod passed through the window frame, as described."

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63. For an *Improvement in the Construction of Grain Carriers;* Adam Linhart and Saml. M'Clain, Fulton, Stark county, Ohio, September 25.

Claim.—"What we claim as our invention, is the mode of constructing the wire belt or straw carrier, as described and represented."

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64. For an *Improvement in Devices for Sowing Seed in Grain Drills;* Pierpont Seymour, East Bloomfield, Ontario county, New York, September 25.

The patentee says,—"The nature of this invention consists in arranging immediately below the seed or grain box of the machine, two horizontal parallel plates, forming the bottom of said box, connected together by links, and provided with a lever for moving one nearer to, or farther from, the other, in order to regulate the quantity of seed or grain passing between the same, and placing beneath said plates a horizontal vibrating bar, having pins on its upper surface, extending through the space between the plates, and connected to a vibrating plate

or bar attached to springs, and provided with an anti-friction roller at its extremity, pressing against a zig-zag plate or wheel secured to the driving wheel of the drill, in such a manner as to cause said bar under the box, and its attachments, to be moved to and fro during the progress of the machine, and the pins to agitate the seed or grain next the space between the plates, and cause the same to pass through said space and descend between angular blocks, which conduct it into the leather tubes, from whence it passes through the drill teeth; and also in attaching the drill teeth to a windlass arranged at the back part of the machine, and operated by a lever, in such a manner as to enable the operator to raise all the drill teeth from the ground at the same time, by simply raising said lever, and otherwise improving the machine to better adapt it to the purposes for which it is designed."

Claim.—"What I claim as my invention, is the combination of the springs attached to the vibrating bar or plate, to which the anti-friction roller is attached, zig-zag plate or wheel, and vibrating bar having teeth on its upper surface, for facilitating the passage of the seed or grain through the space between the parallel plates, as described."

RE-ISSUES FOR SEPTEMBER, 1849.

1. For a *Machine for Breaking Coal;* Joseph Battin, Philadelphia, Pennsylvania; patented October 6, 1843; additional improvement annexed January 20, 1844; re-issued September 4, 1849. (Patent of February 12, 1844, also surrendered.)

Claim.—"What I claim as my invention, is the arrangement of the teeth on the two rollers, substantially as described, so that, in their rotation, the teeth of one shall come opposite the teeth of the other, with sufficient space between to hold lumps of the required size, the rollers being so combined by gearing as to make them rotate in opposite directions, and with the required velocities to retain the relative position of the teeth of the two rollers, as described."

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2. For an *Improvement in Looms for Weaving Carpets and other Figured Fabrics;* Erastus B. Bigelow, Clintonville, Worcester county, Massachusetts; patented May 16, 1842; anté dated May 1, 1842; re-issued September 11, 1849.

Claim.—"What I claim as new, is, 1st, in connexion with the power loom, depressing one trap-board, or more, whilst the other, or corresponding trap-board or boards, is elevated, substantially as described.

"2d, I claim placing and working the journals above the trap-boards, substantially in the manner and for the purpose specified.

"3d, I claim working the card prism of the jacquard by a cam, or the equivalent thereof, connected with the loom or deriving motion therefrom, and whilst the trap-boards are at rest, substantially as described.

"4th, I claim regulating the delivery or giving out of the warps, by the tension of the warps or chain acting on a vibrating roller, or the equivalent thereof, in combination with a regular and positive take-up motion for taking up the woven cloth, substantially as described.

"5th, I claim the employment of a series of shuttle-boxes and a receiving shuttle-box on each side of the loom, and supported in a separate and independent frame by the side of the loom, substantially as described.

"And lastly, I claim stopping the loom when a change of colors is required, by combining the shipper, or the equivalent thereof, with the jacquard, substantially as described."

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3. For an *Improvement in Brussels Looms;* Erastus B. Bigelow, Boston, Massachusetts; patented March 20, 1847, re-issued September 11, 1849.

Claim.—"What I claim as my invention, is, 1st, giving to the two parts of the mechanism,—that which weaves the cloth and forms the body of the fabric, and the one which operates the figuring wires,—a separate and distinct organization, substantially as described, when these are connected and combined by an intermediate mechanism which shifts the motive or driving power from one to the other, substantially as described. And, in combination with this, I claim also the employment of the two brakes to arrest the momentum of the moving parts, to prevent any conflict in the operations of the two parts of the mechanism.

"2d, I claim, in combination with a loom for weaving such looped fabrics as herein designated, the employment of a box, trough, or the equivalent thereof, for receiving and holding the figuring wires preparatory to their being introduced under the figuring warps, substantially as described.

"3d, I claim the fingers, or their equivalents, which receive the figuring wires from under the pile or figuring loops, in combination with the box, trough, or the equivalent thereof, into

which they are deposited preparatory to the intoduction of them under the figuring warps, supstantially as described.

"4th, I claim, in combination with the mechanism which withdraws the figuring wires from under the pile or figuring loops, the fingers, or their equivalent, for transferring the said wires to the trough, or the equivalent thereof, from which, or by which, they are transferred to the open shed of the figuring warps, substantially as described.

"5th, I claim the method, substantially as described, of introducing and dropping the figuring wires in the open shed of the figuring warps, as described.

"And finally, I claim the method, substantially as described, of supporting the figuring wires in the open shed of the figuring warps, when they are being introduced, as described."

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4. For an *Improvement in Power Looms;* Erastus B. Bigelow, Clintonville, Worcester county, Massachusetts; patented August 18, 1846; anté dated February 18, 1846; reissued September 25, 1849.

Claim.—"What I claim as my invention, is, 1st, combining with the lay of a power loom, and on each side thereof, two cams and two rollers, or their equivalents, one of said cams for working the lay, and the other for holding it in a stationary position during the throw of the shuttle, substantially in the manner and for the purpose specified.

"2d, The employment of two series of shifting shuttle-boxes on one or both sides of the lay, hung and operated in separate and independent frames on each side of the lay of the loom, the said boxes being shifted and otherwise operated by machinery receiving motion from the loom, or from some first or other mover working in unison with the power loom, substantially as described and for the purpose specified.

"3d, Combining with the shipper, for stopping the loom when the shuttle fails to pass through, or the equivalent thereof, a protector for each series of shifting shuttle-boxes, hung in separate frames independent of the lay, substantially as described and for the purpose specified.

"And lastly, in combination with the lay of the loom, and shuttle-boxes hung in separate frames independent of the lay, the employment of jointed guides, substantially as described, for guiding the shuttles in their passage from the shuttle-boxes to the lay, and *vice versâ*, and which yield to prevent breaking when the shuttle fails to pass entirely through, substantially as described."

Designs for September, 1849.

1. For a *Design for a Portable Grate;* A. C. Barstow & Co., assignees of Apollos Richmond, Providence, Rhode Island, September 11.

Claim.—"What I claim as my invention or production, is the combination of ornaments on the three-sided frame and blower forming the front of a portable grate, consisting of the swelled moulding, with sunken ovals and circles, the cross panel, gothic panel, and pilaster, on the said frame, and the similar gothic panels on the blower, all as described and represented in the accompanying plate of drawings."

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2. For a *Design for Stoves;* James Wager, Troy, New York, September 25.
3. For a *Design for Stoves;* James Wager, Troy, New York, September 25.
4. For a *Design for Stoves;* John M. French, assignee of Calvin Fulton, Rochester, New York, September 25.

The claim to each of the above patents is for the designs as represented in the specifications.

List of American Patents which issued in October, 1849, *with Exemplifications by* Charles M. Keller, *late Chief Examiner of Patents in the U. S. Patent Office.*

1. For an *Improved Self-Acting Waste Gate or Sluice;* Ambrose Torrey, Boston, Erie county, New York, October 2.

The patentee says,—"The nature of my invention consists in providing a waste gate for mill ponds, canals, reservoirs, and all places where it may be used advantageously, which turns on a horizontal axis, and is opened and shut by the action of the water as it rises and falls."

Claim.—"What I claim as my invention, is a waste gate which revolves on a horizontal axis placed nearer the bottom than the top of the gate, which is opened and shut by the action of the water, and whose motion is restricted by appropriate stops; the whole constructed and operating substantially as described."

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2. For an *Improvement in Portable Copying Presses;* Henry M. Paine, Worcester, Massachusetts, October 2.

Claim.—"What I claim as my invention, is the curved form of the bed and platen plates, as described."

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3. For an *Improvement in Machinery for Spinning Flax, &c.;* Charles Clark, West Troy, Albany county, New York, October 2.

The patentee says,—"The nature of my invention consists in providing what I term a balance frame, suspended below, and combined with, the bobbin or taking-up shaft, to operate the taking-up bobbin by an intermittent motion, so as to make the bobbin wind on the spun yarn with the same regularity and tautness, whether there be little or much yarn on the taking-up bobbin; also to give the flax, &c., two twists during one revolution of the flyer."

Claim.—"I claim the balance frame, constructed substantially as described, and suspended on the axles of the flyer. I also claim the combination of the eccentric with the rocker, the balance frame, the guide bar, the regulating bar, the ratchet lever, and the ratchet rods, and the ratchet wheel on the spindle which moves the bobbin, to move the said bobbin, in the manner substantially as herein described."

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4. For an *Improvement in Couplings for Cars;* Warren D. Hatch, Worcester, Massachusetts, October 2.

The patentee says,—"The nature of my invention consists in a spring tongue, which, when the coupling link is withdrawn, prevents a guided coupling-pin from entering the space in which the coupling link is to be inserted, and which, when the latter is introduced, gives before it and allows the pin to enter and secure the link."

Claim.—"What I claim as my invention, is the combination of a spring tongue with the self-acting guided coupling-pin, arranged substantially in the manner and for the purpose set forth."

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5. For an *Improvement in Varying the Speed of the Mandril in Lathes;* Wm. A. Chapin, Jr., St. Johnsbury, Caledonia county, Vermont, October 2.

Claim.—"What I claim as my invention, is the combination of gears fixed to the cone of pulleys, and made to revolve with and by them, the two gears affixed upon a shaft or axle extended or projected from the mandril, a gear affixed on a tubular shaft, through which the mandril extends, and in which it turns, and the tubular shaft; the whole being applied to the mandril and cone of pulleys, and made to operate in connexion therewith, substantially in manner and for the purpose as specified."

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6. For an *Improvement in Machinery for Raising Water from Wells;* Jehial T. Farrand and William Hinman, Port Byron, Cayuga county, New York, October 2.

Claim.—"What we claim as our invention, is the catching and retaining the sliding plate in its proper position whilst a full bucket is being elevated in a well, and detaching the sliding plate at the moment that the bucket is emptied, to allow the position of the plate to be changed, for the purpose of reversing the motion of the buckets, by means of the combination of the lugs projecting from the side of the sliding plate, and the arms projecting from the shafts, arranged by the ascent and descent of the buckets, substantially in the manner set forth.

"We also claim the manner of upsetting the buckets and discharging their contents, by means of rods that connect the lifting bails of the buckets to the ends of the chain, and the tilting bails, combined with the rods and with the buckets, and operated by the forks at the ends of the levers, substantially as set forth."

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7. For an *Improved Composition for Metallic Packing in Steam Engines;* Green S. Cox, Barbour county, Alabama, October 2.

The patentee says,—"The nature of my invention consists in a composition of the follow-

ing metals, to wit, lead, tin, zinc, and antimony, for the purpose of forming a steam-tight packing that is less liable to wear than packing now in use."

Claim.—"What I claim as my invention, is the application of the composition, as above described, for the purpose of packing steam engines."

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8. For an *Improvement in Carding Machines;* Daniel W. Hayden, Windham, Windham county, Connecticut, October 2.

The patentee says,—"The nature of my invention consists in the application to the carding engine in common use, of several rotating cylinders or top cards, and a frame of vibrating cards or combs, by means of which vibrating cards or combs the said revolving top cards or cylinders are constantly and uniformly stripped, the strippings being deposited in contiguous boxes or troughs for removal, thus presenting continually clean surfaces of the said top cards to the main card cylinder, and producing a uniform delivery of work, and causing the machine to deliver a more uniform sliver or strand continually and uninterruptedly; the several cards being so arranged that they can be adjusted with great exactness, without any danger of the teeth or the additional or top cards touching the teeth of the main cylinder and vibrating cards."

Claim.—"What I claim as my invention, is the employment of the cylindrical top cards, in combination with the vibrating strippers and the main cylinder, the parts being arranged and operated substantially as set forth."

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9. For an *Improvement in Apparatus for Making Mould Candles;* Andrew L. Brown, New Haven, Connecticut, October 2.

The patentee says,—"My improvement consists in constructing the mould with a thread or screw on the upper part, about two inches from the end, for adjusting and securing it in the frame, and a shoulder near the upper end, to support the tallow table, and a hole to admit the wire which supports the wick.

"And attaching all the wires which support the wicks, to a slide worked by a jointed wire handle, and govered by a guard, so that all the wicks may be evened by one motion of the hand, and then be all centred at another motion.

"And in using a smooth end movable tallow table, level with the tops of the moulds, by which means the surplus tallow may be easily scraped off, and the whole kept clean."

Claim.—"What I claim as my invention, is the use of the slide with the wires to sustain the wicks, attached in such a manner that I am able to even and centre the wicks, and, when the tallow has cooled, to entirely withdraw the wires from the candles, each by a single motion of the slide of only about one-half of the diameter of the candle, as described.

"And I also claim the combination of the use of the mould made with an adjusting thread or screw below the end, the shoulder on which the tallow table rests, and a hole for the wire, with the slide and movable tallow table; when the whole is constructed and combined substantially as described."

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10. For a *Process for Making Steel;* Norman M. Isham and Erastus E. Marcy, Hartford, Connecticut, October 2; anté dated November 2, 1848.

Claim.—"What we claim as our invention, is the process described of manufacturing steel by producing, first, a metal imperfectly converted in the cupola furnace, in the manner described, and then submitting said metal to the refinery, constructed as described, wherein the article is perfected by the means made known. 2d, we claim the horizontal blast in the refining furnace, as stated, for blowing a blast of carbonic oxide, as set forth."

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11. For an *Improved Foot-Valve of Steam Engines;* S. W. Rogers, Baltimore, Maryland, October 2.

Claim.—"What I claim as my invention, is constructing the entry valve of a pump which draws water from a condenser, of less specific gravity than water, and arranging it, substantially in the manner set forth, beneath the valve-seat, against which it is supported by the water in the valve-chest, so that when the pump piston is withdrawn in the barrel, and the water in the valve-chest recedes from the valve, the latter, being unsupported, will fall and allow the water in the condenser to flow into the pump through the opening in the valve-seat; but when the water fills the valve-chest, the valve, being lighter than the water, will float upwards and close the opening."

12. For an *Improvement in the Mode of Operating Brakes for Cars;* Nehemiah Hodge, North Adams, Berkshire county, Massachusetts, October 2.

The patentee says,—"My invention consists in so connecting the brakes of the two trucks of a car that the brakesman, in operating upon either set, shall bring both sets down upon their respective wheels at once, and cause each set to act with the same amount of force as it would if disconnected from the other; the arrangement of the several parts being such that it can be conveniently applied to the ordinary brakes in general use."

Claim.—"What I claim, therefore, as my invention, is the peculiar manner, herein described, of arranging the levers and connecting rods, in combination with the brakes, so as to apply both sets of brakes with equal force by working either brake wheel."

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13. For an *Improved Arrangement of the Conductors in Centrifugal Gold Washers;* Lemuel P. Jenks, Boston, Massachusetts, October 2.

Claim.—"What I claim as of my own invention in the above contrivance, is the arrangement of conductors, (on the inner surface of a revolving metallic or other containing vessel,) overlapping each other, thus permitting the particles to be subjected to the action of the water in their passage from one conductor to another."

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14. For an *Improvement in Adjustable Churn Dashers;* Thomas G. Clinton, George H. and Edward H. Knight, Cincinnati, Ohio, October 2.

The patentees say,—"The nature of our invention consists in so constructing and arranging concave beaters, rotating vertically, that the level of the milk may rise above, or fall below, the axis of motion to a very great degree, and still have air distributed there, through by the beaters, in quantities equal to their capacity for holding the same."

Claim.—"What we claim as new, is making adjustable to any desired angle the concave beater, rotating vertically in the process of churning, and thus extending the pneumatic action incident to its concavity to any quantity of milk; the surface of which, and the face of the beaters, can be made to meet in the same plane, as described."

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15. For an *Improvement in Machines for Making Washboards;* William B. Stewart, Cincinnati, Ohio, October 2.

The patentee says,—"The nature of my invention consists in nailing, by pressure upon the nails when properly located and fixed for the purposes desired, any one portion of any article (such as washboards, common boxes, &c.) to any other portion of the same article, whether done by the precise mechanical arrangement described, or done by any other analogous device."

Claim.—"What I claim as new, is driving, by pressure and simultaneously, the series of nails necessary to attach one part of a washboard, box, or other article, to another part of the same as the case may be, by means of the combination of machinery as described, or any equivalent device, viz., the blocks *m*, with their series of drivers, and the blocks *l*, with their series of nail boxes or mortises, springs, and cylindrical guide openings; the blocks *l* forming, to this extent, a portion of the apparatus for nailing by pressure."

"I claim the combination of the apparatus for driving nails by pressure, as described, with the clamp, and the blocks *l*, acting as clamps on the article to be nailed by, to the drivers.

"I claim the combination of machinery, as described, viz., the pressure blocks *l*, in their distinct and separate capacity as such, the table, bed, and clamp, by which the crimped and edge-sharpened sheet metal is made to incise the wood, and by which, in addition thereto, the legs and body board of a washboard are put and held in suitable juxtaposition for the operation of the drivers, whether the combination of machinery, as described, be operated by levers, toggle, and treadle, as described, or by any equivalent devices.

"And lastly, I claim the combinations of machinery, viz., the blocks *m*, drivers, blocks *l*, mortises, springs, guide openings, ways, table, bed, and clamp by which I clamp, incise and clamp, and nail, in the order described, the several parts of a washboard, as described, or a box or other similar article, whether operated by levers, toggles, and treadles, as described, or by other equivalent power."

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16. For *Improvements in Sewing Machines;* Sherburn C. Blodgett, Georgetown, Essex county, and John A. Lerow, Boston, Massachusetts, October 2.

Claim.—"What we claim as our invention in the above described rotary sewing machine, is arranging the shuttle that carries the filling thread, so that it shall revolve horizontally in

a circular shuttle race, said shuttle being constructed with a curved front and pointed nose, which shall travel in a circular guiding groove sunk below the bottom of said race, so that the shuttle shall invariably pass through the loop formed by the needle-thread, all as herein above set forth.

"We also claim the pad or washer under the spring arms which carry the shuttle, for keeping the filling thread straight as explained. Furthermore, we claim the arrangement of the wide spring and bent lever spring, operating as described, or any contrivance substantially equivalent thereto, for relaxing the needle-thread when the loop is to be formed, and holding it rigidly when each stitch is to be tightened, as set forth.

"We also claim the converging nipper springs, through which the needle, &c., passes, to keep the thread up, and prevent the needle from splitting or breaking it, as set forth."

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17. For *Improvements in Machinery for Mitre Sawing;* Dennis S. Stow, Cohoes, Albany county, New York, October 2.

Claim.—"I claim the arrangement of circular saws or cutters, revolving vertically, secured to a bed or block having a horizontal circular motion, the saws or cutters being fitted to arbors moving freely backward and forward in the direction of their axes, this motion of the axes being governed by guide-bars attached to blocks capable of being shifted to any angle with the line of the direction of the stuff to be operated on, these blocks being attached to the moving carriage for the said stuff, and the guide-bars operating in grooved pulleys on the axes of the said saws or cutters, keeping them (the saws and cutters) operating in a line parallel with said bars, the result of which is, that, as the stuff to be sawed, with the carriage on which it is placed, advances on the machine, the movement of the saw is in the diagonal line indicated by the direction of the guide-bar, and the cutting of the material conformable thereto, so that at whatever angle the bar is placed with the direction of the material operated on, at such angle will the saw cut it.

"I claim the combination of mechanical apparatus in the above specification set forth, by which oblique-angled joints, tenons, or work of a similar character can be done, operating, if desired, upon both the ends of a piece of stuff at once, and making, in that case, similar or dissimilar joints or cuts at the two ends at one operation."

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18. For a *Removable Water Lining for the Fire-Boxes of Steam Boilers;* John J. De Haven, Reading, Berks county, Pennsylvania, October 2.

The patentee says,—"My invention consists in the application of a removable water lining, either in separate sections or united, so as to form a complete false fire-box, for the purpose of protecting the main boiler from the intensity of the fire."

Claim.—"What I claim as my invention, is a removable sectional or continuous water lining, or false fire-box, made and arranged substantially in the manner and for the purpose herein set forth."

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19. For an *Improved Machine for Filing Circular Saws;* Israel F. Brown, Columbus, Muscogee county, Georgia, October 2.

The patentee says,—"The nature of this invention and improvement consists in securing the saw to be filed between disks, at the upper extremity of a vertical shaft turning in boxes in a suitable frame, and arranging above said disks and saw an inclined traversing frame, operated by connecting rods and cranks, and attaching to said traversing frame two vibrating adjustable levers, having angular files secured at one end, immediately over the saw, and suspended alternately, by spiral springs at their opposite ends, to a cross-bar secured to the traversing frame, and combining with the same other appurtenances, in such a manner as to cause said files to be forced back and forth over the saw, and alternately with the reversion of the same, to file and sharpen the tangential edges of its teeth."

Claim.—What I claim as my invention, is the combination of the adjustable collars with the adjustable rectangular timbers or blocks, for regulating the up and down play of the levers and files, and moving them to either side as occasion may require, as described; thus adapting the machine to various sized saws."

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20. For an *Improvement in Boot Crimps;* Eli R. Horner and William Holland, Fayetteville, Franklin county, Pennsylvania, October 2.

The patentees say,—"Our invention consists in a combination of adjustable clamps, with sheaths for the tree, by which arrangement the leather is drawn down to the tree both lengthways and cross-ways, without risk of cracking or tearing."

Claim.—"What we claim as our invention, is the combination of the top and toe blocks, and their respective sheaths, with the leg, heel, and foot clamps; the whole arranged substantially in the manner and for the purpose herein set forth."

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21. For an *Improvement in Gold Washers;* Louis Lacharme, St. Leger de Feugeret, France, October 2.

The patentee says,—"My invention is designed to perform three distinct operations on the mineral or earthy material containing gold: first, to separate the fine and coarse gold particles, as well as the fine and coarse earthy materials, from each other; second, to amalgamate completely the fine gold; and thirdly, to wash and separate the coarse particles of gold, without the necessity of amalgamating them."

Claim.—"What I claim as my invention, is the combination of the perforated screen with the ore and water leader and the jet tube, whereby the materials capable of passing through the holes of the screen are at once separated from the coarse gold and gravel, and the meshes of the screen are kept perfectly clear.

"I also claim the agitator, with its fingers so constructed and operating that they can have only an alternating motion, in combination with the cistern, whereby the coarse particles of gold are separated from coarse sand and other materials, while a current of water is flowing over them, in the manner herein set forth.

"I also claim the arrangement, in a single machine, of the revolving screen, and the amalgamator, the fingers, and the cistern, whereby the washing and amalgamating of gold in fine particles is performed simultaneously and at one operation with the washing and separating of coarse gold from sand and gravel, with amalgamation, in the manner and for the purposes substantially as herein set forth."

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22. For an *Improvement in Portable Ovens;* Calvin Doane, Wareham, Plymouth county, Massachusetts, October 9.

Claim.—"What I claim as my invention, is the combination with the back of a common cylindrical air tight stove of an oven frame, and a portable trapezoidal oven, susceptible of being hinged to, or unhinged from, said frame, as set forth."

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23. For an *Improvement in Water Wheels;* William G. Masterson, Amesbury, Essex county, Massachusetts, October 9.

The patentee says,—"My improvement consists in passing the water round the wheel any given number of times, in a horizontal direction, the water descending from one level to another at the termination of each revolution, and being made to pass through any given number of contractions, which I call buckets, in its course, by which means I keep the water in a solid body without breaking before it makes its exit from the wheel, and cause it to press with the four sides of its column on said buckets, by which I attain the full force of the water upon the wheel while passing through it."

Claim.—"What I claim as new, is forming the water courses of a series of horizontal flanches, with inclined openings for communication, as described, and with contractions or buckets placed at intervals in said compartments, substantially in the manner and for the purpose set forth."

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24. For an *Improved Jointed Centre-Board;* Thomas Maskell, Franklin, St. Mary's parish, Louisiana, October 9.

Claim.—"I therefore claim a jointed centre-board, constructed substantially as described, having its two ends connected with the false keel, into which it is recessed, and its centre portions jointed and connected with a rod that passes up into the vessel, by which it can be worked up and down, in the manner and for the purposes set forth."

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25. For an *Improvement in Cooking Stoves;* James Leffel, Springfield, Clark county, Ohio, October 9.

Claim.—"What I claim as new, is extending the front diving flues along under the hearth plate, aside and in front of the ash pan, and thence down in front of the oven plate, thus forming there an open flue, when the oven is extended under the hearth plate, in the manner and for the purpose described."

26. For an *Improvement in Hydraulic Presses for Cotton, &c.;* Charles Wilson, Williamsburg, Kings county, New York, October 9.

Claim.—"What I claim as my invention in the double hydrostatic press, is connecting the two rams substantially in the manner set forth, so that they shall operate together and with equal effect upon the platen of the press; all as set forth."

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27. For an *Improvement in Churns;* Alexander Hall, Loydsville, Belmont county, Ohio, October 9.

The patentee says,—"The nature of my improvement consists in combining a vertical reciprocating dasher with a horizontal rotary dasher, so as to break and agitate the cream in two directions at once."

Claim.—"What I claim as my invention, is the combination of a reciprocating dasher with a revolving dasher, the two being arranged and operated substantially as set forth."

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28. For an *Improvement in Burring Cylinders;* Charles G. Sargent, Lowell, Middlesex county, Massachusetts, October 9.

Claim.—"What I claim as my invention, is a cylinder for burring, opening, picking, carding, &c., cotton and wool, in which the burring or working surface is formed by alternate rows of sharp pointed teeth and thin metallic edges, either set spirally or straight across the cylinder, whether said teeth and edges are constructed and shaped as above set forth, or in any other way substantially similar thereto; it being distinctly understood that my claim is to the burring or working *surface* produced as above suggested."

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29. For an *Improvement in Supporters for Telegraph Wires;* L. R. Livingston, J. J. Roggen, and Calvin Adams, Pittsburg, Pennsylvania; and Amos Kendall and Alfred Vail, City of Washington, D. C., October 9.

The patentees say,—"The nature of our invention consists in confining the shank of a telegraph wire holder or supporter in a protecting socket or cavity, by means of some suitable insulating substance, placed while in a fused or softened state in the socket around the shank of the wire holder or supporter; or, if preferred, the insulating substance can be first placed in the socket or cavity, and the shank of the wire holder or supporter inserted therein while it (the insulating substance) is in a soft state."

Claim.—"What we claim as our invention, is the uniting and confining the shank of a pendant wire holder, or the upright portion of a supporter, within a protecting socket or cavity, by means of some suitable insulating substance, placed while in a fused or softened state within the socket or cavity, and occupying the space between its interior surface and the shank of the holder or supporter, substantially in the manner herein set forth; not intending, however, to limit ourselves to the particular forms or positions of the insulated wire holders and supporters referred to above, the essence of our invention, as therein claimed, being the production of an insulated connexion between the wire supporters and the holders, by placing the insulating material, while in a fused or softened state, within a socket or cavity in the one, and around the shank of the other.

"We also claim the manner of confining the telegraph wire to the holder, by means of a notch or hook thereon, and a loop or link combined therewith, substantially as represented."

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30. For an *Improvement in Hanging Shafts in Mills;* Edward Bancroft, Philadelphia, Pennsylvania, October 9.

The patentee says,—"The improvements referred to consist in making the bearings or support for shafts, whether hangers or pillow-blocks, in such a manner that they shall at all times, and under any circumstances, conform accurately to the journals of the shafts; also, in being susceptible of easy and accurate adjustment in a vertical direction, in case of any sinking or settlement of the walls or timber to which they may be attached, and, at the same time, not be more liable to be thrown out of line than bearings of the ordinary construction; and further, in making the oil-catcher form a part of the box of the hanger or pillow-block, by casting it thereto, thus giving it additional strength without unnecessarily increasing its weight."

Claim.—"I do not claim the suspending a box or bearing for a shaft by means of the ball and socket joint, nor the making the same in several parts; but what I do claim as my invention, is the general arrangement and construction of the complete hanger or pillow-block, with or without the oil catcher forming a part thereof, made substantially in the manner and for the purposes herein above described."

31. For *Improvements in Ore Washers;* Jacob Pritchett, Philadelphia, Pennsylvania, October 9.

Claim.—"What I claim as new and my invention, is, 1st, the arrangement of the bevel wheel, with a rib on the back, in combination with the pin, set screws, and pinions, which are for the purpose of giving a reciprocating rotary motion to the pan. 2d, The vibrating pump, in combination with the pan. 3d, The reciprocating rocker, with curved ribs, in combination with the shaft and its fingers, substantially in the manner and for the purpose set forth."

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32. For *Improvements in Reciprocating Propellers;* Henry W. Hewet, City of New York, October 9.

The patentee says,—"The character of my invention consists in the construction of propellers for vessels, the main object sought being the conveyance of the propeller through the water so as to avoid, as far as possible, angular action, and render the motion parallel to that of the vessel."

Claim.—"What I claim as of my own invention, is the combination of the sliding frames, to which the paddles are attached, with the horizontal guides and vertical guides, said paddles being actuated by motion derived from, and mechanism connected with, the engine shaft, and the whole being constructed, arranged, and operating substantially as described, whereby a more extended horizontal motion of the floats, in comparison with the length of their vertical motion, is obtained."

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33. For an *Improvement in the Manufacture of Band-Boxes;* William Tabele, City of New York, October 9.

The patentee says,—"The nature of this invention consists in forming inside the lower part of the body of the band-box, and inside the part surrounding the same composing the lid or cover, grooves or creases, by means of fluted and grooved rollers, and inserting in said grooves, by springing and glueing, concavo-convex heads, or top and bottom, and in applying above the top another concavo-convex top board, in such a manner as to give strength to the box, and leave a space between the lower edge of the body of the same and the bottom, to prevent the bonnets, hats, or other articles contained in the box, being injured by water or dampness getting in from below, and a space between the upper edge of the cover and the two concavo-convex spring boards of the top, to prevent the same being bent from anything heavy being placed on the same."

Claim.—"What I claim as my invention, is the construction of the concavo-convex heads, or top and bottom boards, inserted into grooves formed in the bodies of the box and lid, and secured by glueing with the additional concavo-convex top board, susceptible of being replaced at pleasure, as herein set forth."

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34. For an *Improvement in Bed-Plates for Paper Engines;* William Clark, Dayton, Montgomery county, Ohio, October 9.

The patentee says,—"My improvement consists both in the form of the plate and the material of which it is made."

Claim.—"What I claim, is casting the bed-plate of the paper engine in one piece, having the cutting or grinding edges arranged over the surface of the plate in diamond or lozenge-shaped figures or curves, so as to present a number of angles or shearing edges, for the rags to pass over, between that surface and the roller above, in the manner and for the purpose set forth."

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35. For an *Improvement in Lapping Machines;* Samuel Campbell, New York Mills, Oneida county, New York, October 9.

Claim.—"What I claim as my invention, is the manner in which the heads are constructed and arranged, so as to revolve in removing or changing the laps. Also, the introduction of the doubling roller as part of the same machine, and the manner in which the adjusting guides are constructed, so that one or more can be displaced, and the remainder uniformly divided into the same space occupied by the whole; whether the arrangements are precisely the same as herein represented, or in any other manner which is substantially the same, and producing a like result upon the same principle."

36. For an *Improvement in Elastic Cords for Suspenders;* Nelson Goodyear, City of New York, October 16.

Claim.—"What I claim as my invention, is the making of elastic cords for suspenders, by braiding or winding silk, cotton, or other threads, around cords of metallic or vulcanized India rubber whilst in a partially distended state, substantially as described, whereby springs of greater resisting force are produced than by any other known plan."

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37. For an *Improvement in Cooking Stoves;* Hannibal Mathews, Cincinnati, Ohio, October 16.

The patentee says,—"The nature of my improvement consists in arranging the flues in a double-oven stove, the stove having the ordinary top or boiler flue, and also having the flue between the ovens divided into three compartments, the side flues of this division being entered by diving flues opening at the upper front corners of the stove, aside of the front door of the fire-place, carried down the back part of the lower oven, and discharged at its bottom and back corners; the bottom flue being an open one, with a central stay or guide-plate in the line of the breadth of the stove, so as to compel the draft to hug the sides and corners of the stove; the flue at the front of the lower oven being an open one, and the flue at the back of the upper oven being also an open one, so that, by throwing down a damper in the top or boiler flue, and a damper in the middle flue of the flues between the ovens, thus opening the said flues, the heat can be applied almost wholly to the upper oven, as in a premium stove, so called; and by closing said flues, by throwing up these dampers, the heat can be thrown around both the upper and lower ovens, and be distributed in the most equable manner; the top or boiler flue, (the whole of the said flue being in front of its damper,) and the middle flue of the flues between the ovens, (both before and behind its damper,) being converted more or less into hot air chambers, and the draft being forced down the front diving flues, and around the lower oven at the sides of the stove, through the side flues of the flues between the ovens, and at the back and corners of the lower oven, and down the open flues in front of, and beneath, the lower oven, and up the middle flue of the flues back of the lower oven, the open flue back of the upper oven, and thence up the stack or pipe."

Claim.—"What I claim as new, is constructing and arranging the top or boiler flue, the middle flue, and the side flues of the flues between the ovens and the corner flues at the back of the lower oven, so that, by opening the dampers, the upper oven can be rendered operative alone, or, by closing the same dampers, be operated in connexion with the lower oven; the flues and guide-plate being so constructed and arranged that the heat and draft will be compelled to pass along the sides and corners of the stove, when these flues are thus, or in an equivalent manner, called into action, the heat being thereby most equably distributed, as the hot draft is thus made to traverse an equal distance both above and below the lower oven, and also surround the centre of the stove, and of course keep the said centre at the same temperature as the sides and corners; the whole being arranged, constructed, and combined in the manner and for the purpose described."

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38. For an *Improvement in Ploughs;* Benjamin Seyler, Franklin county, Pennsylvania, October 16.

Claim.—"What I claim as my invention, is joining the lower edges of the mould-board and fixed land-side, by means of a sole cast in one piece with them, whereby the plough is greatly strengthened, and the fastening of the share rendered more secure.

"2d, I claim making an aperture through the side of the fixed land-side, for the purpose of introducing a wrench to turn the nut on the bolt which holds the share to the sole, the aperture being combined with the manner herein described of fastening on the point."

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39. For an *Improvement in Apple Parers;* Charles P. Carter, Ware, Hampshire county, Massachusetts, October 16.

Claim.—"What I claim as my invention, is the use of the upright lever arm in combination with the rack-bar, for working the knife, in the manner and for the purpose set forth. I also claim the upright lever, in combination with the inclined lever bar and discharging bar, in the manner and for the purposes described."

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40. For an *Improvement in Tanning Leather by Tannin and Acids;* Harmon Hibbard, Henrietta, Monroe county, New York, October 16.

The patentee says,—"The nature of my invention consists, 1st, in the use of a composition

of lime, wood ashes, (or potash,) and salt, for the purpose of removing hair or wool; also for the purpose of 'liming,' so called, instead of using lime alone, as in the old method.

"2d, In the use of a composition of salt, sulphuric acid, and sumac, oak bark, or any other tannin, for the process of tanning."

Claim.—"What I claim, is, 1st, the process of removing hair and wool from skins, and of liming them preparatory to tanning, by the use of the composition of lime, wood ashes, and salt, called composition No. 1, in the manner described.

"2d, I claim the process of tanning skins, by the use of tannin in combination with muriatic acid, generated by a mixture of sulphuric acid and chloride of sodium in water with the tannin, in the manner substantially as described.

"3d, I claim, also, the use of the acetate of lead in the above process of tanning, as described."

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41. For *Improvements in Ore Washers;* Peter Von Schmidt, City of New York, October 16.

Claim.—"What I claim as my invention, is the rotating screen, substantially as described, in combination with the rockers and drag chains within it, substantially as described.

"I also claim the rotating screen, with the spiral blades on its outer periphery, in combination with the trough in which it works, and through which the substances delivered by the meshes of the screen are made to pass, substantially as described.

"I also claim the washing trough, with its compartments, in combination with the rockers and drag chains, substantially as described.

"And finally, I claim the longitudinal grooves or chambers in the bottom of the trough, and at right angles to the motion of the rockers, and in combination with such rockers, substantially as described."

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42. For *Improved Machinery for Drawing Out and Compressing Heated Iron;* Henry Burden, Troy, Rensselaer county, New York, October 16.

Claim.—"What I claim as my invention, is the method of working puddlers' balls, or other highly heated masses of iron, and reducing them into bars, by rolling and squeezing them gradually from one end, by surfaces whose motion or motions is at right angles, or nearly so, to the axis of the bar to be produced, substantially as specified.

"And I also claim as my invention in the machinery for the application of my improved method of working iron, the rolling and squeezing of balls, or other highly heated masses of iron, between surfaces inclined to the axis of the bar to be produced, substantially as described, so that, by the motion of one or more of the said surfaces at right angles, or nearly so, to the axis of the bar to be produced, the mass of iron shall be gradually squeezed and reduced, and carried towards and out of the space between the said inclined surfaces where they are nearest together, the iron bar being thus delivered in the required form, substantially as described."

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43. For *Improved Journals for Oscillating Propellers;* Matthew A. Crooker, City of New York, October 16.

Claim.—"What I claim, is the application of springs to the journal boxes, in such a manner as to ease the strain upon the cranks and paddles when the paddles meet with an extra weight or resistance suddenly, thereby lessening very materially the danger of breaking the cranks and other parts of the machinery, which are combined and operate substantially as set forth."

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44. For an *Improvement in Boot Crimps;* Benjamin Livermore, Hartland, Windsor county, Vermont, October 16.

Claim.—"What I claim as my invention, is the method of securing and holding on to the leather, by means of the wedge operating in the mouths or openings in the ends of the prongs of the instrument, as described and set forth."

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45. For an *Improvement in Accoucheurs' Chairs;* Newman W. Smith, Shutesbury, Franklin county, Massachusetts, October 16.

Claim.—"What I claim as my invention, is the seat, which, from its peculiar form and structure, closely resembles that part of the human frame between the knees and the breech.

"And I further claim varying the angle which the seat makes with the back, by moving the middle posts forward or backward by means of the tightening screws, the grooves on the front end of braces, through which grooves the said tightening screws pass into said middle

posts; the object of all which is to afford relief to a patient in travail, by means of changing her position, and furnishing supports for her feet and limbs, and objects for her hands to grasp."

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46. For an *Improvement in Instruments for Arresting Hemorrhage from Internal Organs or Cavities;* Ashbel B. Haile, Norwich, New London county, Connecticut, October 16.

Claim.—"What I claim as my invention, is the application of an elastic and distensible bag, sack, or bottle, to various of the canals or cavities of the human body, opening externally, and the subsequent distension of the same by forcing into it air or other available fluid, for the purpose of arresting hemorrhage."

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47. For *Improvements in Looms for Figured Fabrics;* Joseph Reynolds, Providence, Rhode Island, October 16.

Claim.—"What I claim as my invention, is a combination of machinery composed of the following elements, and applied to a series of shuttle boxes, for moving or operating them as specified. The first element of combination is the series or two packs of pattern plates; the second element is the two slide or moving frames, by which the plates are moved horizontally, as described; the third element is the machinery for moving the pattern plates in vertical directions, one set being moved upwards and the other set downwards, substantially as specified; the fourth element is the system of hooks, their lever-plates, bell-crank levers, and connexions; the fifth element is the slide-board and its series of slides, and their projecting pins and appliances, as above described; the sixth element is the system of bent levers, pawls, and mechanism for moving the same, as described; the seventh element is the toothed sector and rack, which connects the long arm of the series of shuttle-boxes with the slide-board.

"I also claim the combination of machinery applied to shuttle-boxes, and for the purpose of preserving the position of the series while any shuttle thereof is in operation; the said combination consisting of the series of pins, the fork lever, the lever n^5, and its hinged spring plate, the slide and its pins or studs, the spring pawls and their appurtenances; the whole being made to operate together substantially as specified."

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48. For an *Improvement in Cooking Stoves;* Thomas G. Clinton, George H. Knight, and Edward H. Knight, Cincinnati, Ohio, October 16.

Claim.—"What we claim as new, is, 1st, providing for the escape of the steam and effluvia from the cooking victuals in a reverberating boiler chamber, a channel arranged so as at the same time to isolate the upper oven from the top flue, and, by means of the currents, keep it cool, as well there as where bounded by the fire-plate.

"2d, So forming and arranging the plates dividing the lower from the upper oven and ash-pit, with a descending flanch to the upper plate, and an ascending flanch to the lower plate, that a passage to the flues, for the fumes of the lower oven, is provided, without weakening the plates or permitting the ashes to fall through.

"3d, So arranging a vertical dividing plate in the front flue, in connexion with a damper, that a part of the heat of the fire can be applied more directly to the front plate of the lower oven.

"4th, So constructing and arranging a damper, in connexion with the flues, division plate, and stack, with or without the recess in the front plate, as described, that the draft can be thrown either entirely around the stove, or in part down the front of the same, or be entirely shut off, or have direct entry to the stack."

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49. For an *Improvement in Grate Bars;* Cornelius Kingsland, Allegheny, Allegheny county, Pennsylvania, October 16.

Claim.—"I claim as my invention, making the upper and lower faces of the bar with the same rise or elevation, so that when the upper or top face of the bar is destroyed by the action of the fire, the bar can be turned or inverted, making the lower side to become the upper surface, and by that means present a new surface to the fire, causing thereby a considerable saving in the expense of furnace bars."

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50. For an *Improved Method of Attaching Knobs to Doors;* James A. Crever, Pittsburg, Pennsylvania, October 16.

Claim.—"What I claim as my invention, is the mode of holding in position the knob, by means of the end of the latch, being pressed through the opening into the stirrup."

51. For an *Improvement in the Rockers of Gold Washers;* Thomas J. Green, Jamaica Plain, Norfolk county, Massachusetts, October 16.

The patentee says,—"The nature of my improvement consists in giving to the rocker a compound motion, so that when it is rocked to and fro on the rails, it shall at the same time be shaken, and the perforated plate placed therein will be moved from side to side."

Claim.—"What I claim as new, is the compound action rocker, constructed and arranged substantially in the manner and for the purpose set forth, consisting of rockers with ribs or projections thereon, and springs to arrest them.

"I also claim the sliding plate, in combination with said ribbed rocker, as described."

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52. For an *Improvement in Bog-Cutting Machines;* Abner Follet, Windham, Windham county, Connecticut, October 16.

Claim.—"What I claim as my invention, is the box or sledge, provided with horizontal and vertical knives, which project from its side, cutting off the hummocks or tufts; the whole being made and arranged as set forth."

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53. For an *Improved Double Cylinder Spike Machine;* Edwin B. White, Nashua, Hillsborough county, New Hampshire, October 16.

Claim.—"What I claim as my invention, is the method of forming or compressing a spike between half dies on the periphery of two cylinders revolving in opposite directions, the axis of the spike being parallel with the axis of the cylinders, substantially as described; said cylinders being provided with appropriate devices for cutting off, feeding in, and heading the spikes."

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54. For an *Improvement in Machines to Manufacture Horse Collars;* William Criswell, Butler, Butler county, Pennsylvania, October 16.

The patentee says,—"The nature of my invention consists in bending and holding collars against the central former, by means of segmental slides and keys, inserted into apertures in the bench, to do away with the present mode of bending and holding the collars against the former by the hands of the operator and a mallet."

Claim.—"What I claim as my invention, is the combination of the T-shaped segmental sliding forming blocks with the central oval-shaped forming block, and mortised bench into which they are secured; said sliding segmental forming blocks being pressed against the rim of the collar by means of keys, in the manner set forth. The oval-shaped former and bench are not claimed individually or in connexion, as they have been heretofore used for making horse collars, in combination with a rope and windlass for drawing the collar around the block; the before described machine being principally designed for bending and holding the rim of the collar to its required form;—the shaping of the rest of the collar being done in the usual manner."

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55. For an *Improved Method of Giving a Rotary Motion to the Melted Iron in Casting Chilled Rolls;* John C. Parry, Pittsburg, Pennsylvania, October 16.

The patentee says,—"My invention consists in an improved method of giving to the melted metal, as it rises in the mould and chill in which the roll is cast, a rotary or swirling motion. The effect of this motion is to throw any foreign matter, slag, or dross, and the lighter particles of the melted metal to the centre, so that the heavy and best portions of the iron are at the outside or surface of the roller or other casting."

Claim.—"What I claim as my invention, is the application of a guide to the mouth of a gate entering the mould horizontally in direction at right angles to the axis of the cylinder, for the purpose of producing the swirling motion of the iron. I also claim, in connexion with the guide, the use of the collar, connecting at all parts of its circumference with the mould, so as to admit the iron in a steady stream at all parts at the same time."

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56. For *Improvements in Jacquard Looms;* E. B. Bigelow, Clintonville, Worcester county, Massachusetts, October 23.

The patentee says,—"The first part of my invention consists in giving to the jacquard a separate organization independent of the loom, that the various motions of the jacquard may be taken from, or given by, a shaft or shafts within it, and simply deriving its or their rotation from some part of the loom, or from some first mover corresponding with, or regulated by,

the motion of the loom or part thereof, that the motions of the jacquard may correspond with those of the loom. In this way the motions of the jacquard are rendered more accurate and steady, and the weight of the motive parts is greatly reduced.

"The second part of my invention consists in making the whole frame of the jacquard adjustable at one operation relatively to the frame of the loom, that the distance between the two may be adjusted to the varying lengths of the cords of the harness, whereby the utmost nicety in the adjustments can be obtained.

"The third part of my invention relates to the shuttle-motion of looms which have series of shuttle-boxes in separate pendulous frames at the sides of the lay, and consists in communicating the required motions to the picker-staffs, and to the apparatus for shifting the shuttle-boxes, from a shaft or shafts above, whereby I avoid the difficulty of communicating the motions from a shaft or shafts below, to the picker-staffs and the apparatus for shifting the shuttle-boxes, which must be attached to, or connected with the shuttle-box frames that vibrate on axes above.

"And the last part of my invention relates to the introduction, in power looms, of a reversing motion."

Claim.—"What I claim as my invention, is, 1st, giving to the jacquard frame of jacquard looms, working by power, a separate organization: that is, giving the various motions of the jacquard by a shaft or shafts within, or making part of, the jacquard, in contradistinction to the weaving loom, but receiving motion from the loom, or from some first mover governed by, or working in unison with, the loom, substantially as described, and for the purpose specified.

"2d, I claim the method of adjusting the jacquard frame relatively to the weaving loom, substantially as described, so that the attendant can, from a given point, make the adjustment to suit the condition of the harness, as described.

"3d, I claim taking the motions, for operating the picker-staffs and the apparatus for shifting the shuttle-boxes, from a shaft or shafts placed above, and in combination with, the pendulous frames which carry the shuttle-boxes, substantially in the manner and for the purpose specified.

"And lastly, I claim, in combination with the power loom, a reversing motion, substantially as described, so that, after the driving power has been removed, and the momentum of the moving parts arrested, the attendant may set in motion the reversing motion, and drive the loom in the reverse direction, to bring the parts to the position required for re-starting, substantially as described."

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57. For an *Improvement in Cooking Stoves;* James R. Stafford, Cleveland, Cuyahoga county, Ohio, October 23.

The patentee says,—"The nature of my invention consists in heating the bottom oven plates of stoves or ranges, by other means than by causing the flame, smoke, or air, which has passed through the fire, to pass under the same, as is herein more particularly described."

Claim.—"What I claim as my invention, is the manner herein described, of causing the air contained within the oven and spaces to circulate within and under the oven, without allowing the heated air to pass from the oven or spaces into the fire-chamber or smoke-pipe; which effect is produced by locating the plate *e* within the oven and near the fire-back *d*, and connecting the space between *e* and *d* with the body of the oven, and with the space between the bottom plate of the oven and the plate *b*, and also connecting the space below the bottom plate of the oven with the rear end of the body thereof, substantially as herein set forth."

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58. For an *Improved Spring Latch-Bolt;* Elias M. Ray, Norfolk county, Massachusetts, October 23.

Claim.—"What I claim as my invention, is arranging the spring in the cavity of the bolt, with one end of said spring bearing upon the end of the cavity in the bolt, and the other end of it, or its equivalent, upon the tumbler, as herein described; whereby I am enabled to dispense with the usual bearings for the spring external to the bolt."

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59. For an *Improvement in Planing Machines;* Enos G. Allen, Boston, Massachusetts, October 23.

The patentee says,—"My invention consists, first, in a peculiar arrangement of the feeding apparatus, and second, in peculiar arrangements of the mouth-pieces of the plane irons, for the purposes described."

Claim.—"What I claim as my invention, is the combination of adjustable stationary planes

with an endless band, supported transversely by friction rollers, whose axes are immediately below the cutting edges of the plane irons, and longitudinally by strips, substantially in the manner and for the purpose herein set forth."

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60. For an *Improvement in the Construction of Iron Stairs;* Benjamin F. Miller, City of New York, October 23.

The patentee says,—"My improvement consists in making use of what I term a series of bent stationary levers."

Claim.—"I claim as my invention, constructing stairs in sections composed of the bent lever and under brace connected together, as shown, the tread and brace being part and parcel or continuous with the balusters, the one bent at right angles, the other at the requisite angle for the brace.

"I also claim the bent levers, as herein before described, in combination with the rail, either continuous or in sections, attached to the end of the long arm of said lever, together with the under brace attached to the angle or bend of the short arm of said lever."

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61. For an *Improved Arrangement of the Lever Half-Beam of Steam Engines;* Wm. A. Lighthall, Albany, New York, October 23.

The patentee says,—"My improvement consists in reversing or inverting the pendulum half-beam, by fixing or placing the main beam centre below instead of above, by which means I employ a different order of lever than when working the beam as a hanging or pendulum half-beam, because, in the latter, the weight or resistance to be overcome is between the power and the fulcrum, whereas, in my improved application of the half-beam, and mode of working the same, the power is applied between the fulcrum and the weight or resistance to be overcome, which mode of applying the power enables me to work a long crank instead of a short one."

Claim.—"What I claim as my invention, is the arrangement of a horizontal cylinder, with a lever half-beam having its fulcrum at its lower end, and connecting-rod attachment at its upper end, with crank and shaft above the cylinder, substantially in the manner and for the purposes herein before described."

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62. For an *Improvement in Blocks for Holding Daguerreotype Plates;* Alexander Beckers, City of New York, October 23.

Claim.—"What I claim as my invention, is the application of the cross-piece and lip-clips with the thumb-screw, to hold the plate to be polished on the face of the plate *d*, the plate below the centre of the thumb-screw being fitted to receive, through an aperture in the centre of the screw, a point or stud on a lever, by which the plate *d* can be moved in alternate and opposite directions across the face of a rotary chuck, for the purpose of polishing or cleaning Daguerreotype plates, substantially as described."

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63. For an *Improvement in Looms;* Augustus Faulkner, Walpole, Cheshire county, New Hampshire, October 23.

The patentee says,—"The nature of my improvement consists, 1st, in a particular arrangement and movement of the heddles, by which two separate sheds are produced, through one of which the shuttle carries the weft in moving from left to right, and through the other in moving from right to left, the shuttle always moving in the same direction through the same shed, thus forming a continuous tubular web.

"2d, In the attachment of spring or weighted whip rolls or rods, by which the slack of the warp is taken up; and

"3d, In the arrangement for drawing the cloth through the loom with unequal velocity, so as to render its texture alternately closer and more open in different portions of its length."

Claim.—"What I claim as new, is straining the several divisions of the warp from the same yarn beam equally, by passing the adjacent yarns of the respective sheds over the same whip roll, the extreme yarns being passed over a second whip roll, substantially as described.

"I likewise claim varying the closeness of the texture of the web, by varying the speed of the rolls by which it is drawn through the loom, by devices substantially as set forth."

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64. For an *Improvement in Invalid Bedsteads;* John Karney, Cincinnati, Ohio, October 23.

Claim.—"What I claim as my invention, is the use of the lever to alternately raise and depress the sliding boxes, when these boxes are combined with the horizontal drawer for al-

ternately placing the chamber and cushion under the permanent opening in the mattress, as described."

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65. For an *Improvement in Apparatus for Distilling Sea Water;* John Ericsson, City of New York, and R. B. Forbes, Boston, Massachusetts, October 23.

The patentees say,—"Our invention consists of a boiler, to be worked at very low pressure, with horizontal flue-tubes so situated, relatively to the door for supplying the fuel to the grate, that the opening of this door will expose the flue-tubes to view, and admit of cleaning out the soot that unavoidably collects in, and which would otherwise choke them.

Also, in connecting the steam chamber of the said boiler with the upper end of a condenser, by a flexible pipe attached to a bonnet or dome, which rests on and closes a large aperture at the top of the boiler, in the manner of a safety valve, that it may answer the manifold purposes of steam pipe connexion, safety valve, steam dome or chamber, hand hole, for giving access to the inside of the boiler, and for ascertaining by inspection the height of water in the boiler.

"Also, in condensing the steam, by causing it to pass between two vessels, the inner one kept cool by the flow of water through it, and the other by the evaporating action of the atmosphere on moist cloth or other porous substance surrounding it, that the required condensation may be effectively attained in very warm climates.

"Also, in employing, in combination with the boiler and the condenser, a water feed pipe having a double connexion, one with the boiler and the other with the condenser, whereby the same feed pipe supplies the boiler and condenser.

"And finally, in combining with the boiler and the feed pipe a feed cistern with a cork or other light float, which, when the water is at the required height in the boiler, will be forced up to close the aperture of the feed pipe, and thus cut off the supply."

Claim.—"What we claim as our invention in the before described apparatus for the distillation or production of fresh water on board of ships or other vessels, is connecting the steam boiler with the condenser by means of a flexible pipe, substantially as described, in combination with the valve-joint connexion of the bonnet or steam dome covering the hand hole in the top of the boiler, substantially as described, whereby this connexion is rendered of manifold uses, as described.

"We also claim condensing the steam by passing it in a space between two vessels, the inner one kept cool by a current of water, and the external one surrounded by woolen or other porous substance to be kept in a moist state, to condense the steam by the evaporating effect of the atmosphere on the moistened surface surrounding the outer case, substantially as described, whereby the apparatus is especially adapted to very low latitudes, as described.

"And finally, we claim the feed pipe for supplying water to the condenser, and for feeding the boiler, substantially as described, in combination with the cistern that conducts the feed water to the boiler, and provided with a float for regulating the flow of water from the feed pipe, substantially as described, whereby the apparatus is rendered self-feeding without liability of derangement, as described."

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66. For an *Improvement in Surfacing Floor Oil Cloth;* James D. Sparkman, Williamsburg, and Melville Kelsey, Brooklyn, assignees of William Berry, Bedford, Kings county, New York, October 23.

Claim.—"I claim as new as follows: The application of the fixed suspending timbers, or slotted railways, and carriage *g*, with the changeable slotted timber or railway, to carry and adjust the working parts at different heights and positions on the grounding frames, conjointly with the arrangements described and shown, by which the arms and a plurality of surfacing blocks, *p p*, are applied to smooth the face of the canvas, by the power of a man or men, operating through the crank and cylinder and pinion, in alternating right lines on the rack, and kept in place by the collar, carriage *x*, and rollers; and the employment, conjointly with the foregoing parts, of the blocks *g* and screws, to adjust the pressure *p p* on the face of the canvas operated on; the whole constructed, arranged, and operating substantially in the manner and for the purpose described and shown."

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67. For an *Improved Circular Saw-Set;* Elhanan W. Scott, Lowell, Middlesex county, Massachusetts, October 23.

Claim.—"What I claim as my improvements, are the diagonal and angular adjustable slotted gauges attached to the set, in the manner and for the purposes described."

68. For an *Improvement in Locomotives for Ascending Inclined Planes;* Andrew Cathcart, Madison, Jefferson county, Indiana, October 23.

The patentee says,—"The nature of my invention consists in so constructing a locomotive that, while its speed on ordinary grades is not affected, yet it can, when required, draw a heavy load up a steep inclined plane. It is based upon the assumption that the power of a locomotive available in drawing a load (other things being equal) is proportioned to the amount of steam expended in moving over a given length of track; and therefore, in order that the tractive force of the locomotive may be increased, to enable it to exert sufficient power to draw the load up an inclined plane, the engine should consume the steam as fast when moving slowly up the ascent, as it does when moving on a level at its ordinary speed."

Claim.—"What I claim as new, is a spring or other equivalent device, for holding a self-adjusting toothed driving wheel in gear with a toothed rack, substantially as set forth.

"I likewise claim the employment of steam acting on the piston of a supplementary cylinder, to throw an adjustable toothed driving wheel in or out of gear with a stationary rack, and at the same time to operate as a spring to hold it in either position, substantially as set forth."

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69. For an *Improvement in Apparatus for Holding Daguerreotype Plates;* William and William H. Lewis, City of New York, October 23.

The patentees say,—"Such improvements consist in so applying a horizontal vice to one end of the plate, that it shall be firmly held in place for that purpose by mechanical means."

Claim.—"We claim as new, the application of the cam, acting to depress the rebated chop on the plate beneath, conjointly with the screw to adjust the parts, for the purpose of holding the plates while polishing the same, substantially as described."

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70. For a *Self-Adjusting Valve for Regulating the Admission of Air to Fan-Blowers;* Frederick S. Barnard, Zanesville, Muskingum county, Ohio, October 23.

Claim.—"What I claim as my invention, is the combination of the case of resisting plates, and mortised end plate, with the turning valve, when made with radial wings and segmental cut-off plates, retained in its required position by a spring, or by a weight, cord, and pulley, or other mechanical equivalent, said valve operating substantially in the manner and for the purposes set forth."

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71. For an *Improvement in Gearing;* Benjamin Arnold, East Greenwich, Kent county, Rhode Island, October 30.

The patentee says,—"The nature of this invention consists in making the large or main pulley, or the shaft or arbor of the lathe or engine, hollow, and arranging within the same cogged and eccentric gearing, of such construction and arrangement as will either cause said arbor or shaft to turn with a much lower motion than the pulleys, with a corresponding increase of power, or revolve with the same speed as the pulleys, at the option of the operator, thus dispensing with the ordinary complicated gearing, and the many disadvantages attending the same, and forming a simple and effective gearing enclosed within the main pulley, and not therefore liable to become entangled with the band, or to catch the hands, or otherwise injure persons working at the lathe."

Claim.—"What I claim as my invention, is the mode of transmitting motion from the pulleys of a double-geared lathe or turning engine, to the main shaft or arbor of the same, with a decreased speed and a corresponding increase of power, by means of the eccentric secured on the inside of the large hollow pulley, and turning within the large wheel arranged eccentric with the shaft, and having cogs on the inner periphery of the projection, at its outer edge, meshing in gear with a circular cogged ring, secured to the inner surface of the detached face plate, and held stationary by the connecting rod or plate; and also the hub, keyed to the shaft or arbor, having arms made convex on their extremities and concave on their sides, so as to form circular openings or spaces when inserted in their places, in which the bolts or pins revolve in their passage around the axle or arbor, alternately striking the concave sides of the arms and causing them to revolve slowly, in such a manner as to cause the large cog wheel to revolve around the cogged ring just so many cogs as it possesses more than said ring, at every revolution of the eccentric, and a proportionate slow speed to be given to the shaft or arbor, as set forth, or in any other mode substantially the same."

72. For an *Improvement in Feed Apparatus for Shingle Machines;* Henry Burt, Cohoes, Albany county, New York, October 30.

Claim.—"I claim a self-adjusting feed motion, produced by the interposition of friction between metallic surfaces, in the connexions of the parts of the driving gear, or any two of those parts, by means of a friction strap, as described, or any analogous mode, which shall allow the adaptation of the speed of the carriage, holding the material to be cut, to the resistance the material affords to the saw, especially in cases where unusual and temporary obstacles, such as knots, &c., interpose, which might otherwise cause the destruction of the teeth of the saw and other parts of the machine, a very important practical result of the adjustment being that it produces smoother sawing in stuff of irregular texture than machines now do."

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73. For an *Improvement in Looms;* Henry Bachofner, Springfield, Hampden county, Massachusetts, October 30.

The patentee says,—"The nature of my improvement consists in the construction and arrangement of parts for working the harness, and their connexion with the moving power, by which I simplify the loom and save a considerable amount of the power required to drive looms as heretofore constructed."

Claim.—"What I claim as new, is, 1st, the combination of the jacquard cylinder with the depressing frame and fingers, for the purpose of working the uprights thereby through the medium of the fingers, as set forth.

"2d, I claim the combination of the lifting and depressing frames with the crank shaft, by means of a rock shaft, connected with said frames by connecting rods, and worked by the crank shaft, with which it is connected by a rod for that purpose.

"3d, I claim the frames for suspending and carrying the harness, in combination with the marches and the apparatus for working the same, as specified.

"4th, I claim the combination of the hooks, for lifting and depressing, with the marches and harness frames, without the aid of cords, as set forth.

"5th, I claim the construction and application of the adjustable crank, by which I effect an adjustment in all directions in a simple and convenient manner."

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74. For an *Improvement in Stoves;* James Cole, Cincinnati, Ohio, October 30.

The patentee says,—"The nature of the first part of my invention consists in making the point of discharge for a reverberated current of the results of combustion immediately aside of the point of intensest combustion in the primary current thereof, by admitting jets of atmospheric air from points sufficiently elevated, down into an otherwise closed fire chamber, and directly upon the burning fuel, so as to bring the air into contact therewith, and transfuse it throughout the gases evolved during combustion; and consists, also, in forcing the heated jets of air, and the gases, to pass to a reverberating drum, through an orifice so restricted and limited that the adjoining end of the drum can be made to constitute a channel around this, the point of intensest combustion, by which channel the reverberated current flows around, and is brought into close contact with the current rushing out of the fire chamber, so that any unconsumed combustible gas in the reverberated current is at its lowest degree of temperature, and, when it most needs it, attracted to be re-inflamed again, and carried along by, and commingled with, the current from the fire chamber, at the latter current's highest temperature and inflaming capacity, previous to being drawn off by the exit pipe attached to the said channel, and opening immediately aside of, and above, or in a horizontal drum below or above the said orifice.

"The nature of the other part of my invention consists in prolonging, controlling, and equalizing the passage of the reverberated current to the exit pipe, by inserting a disk or diaphragm at a level immediately above the opening to the exit pipe, this disk having a central orifice somewhat larger than, and directly in line with, the orifice in the fire chamber, and being perforated with small holes over three-fifths of its area or thereabouts, on the part over the channel or discharging chamber opposite the exit pipe; the part of the disk over the exit pipe being intact, so that all discharges from the reverberating drum must be made between the current from the fire chamber and the verge of the central orifice in the disk, except so much as must pass through the perforations in the area of the disk, as before mentioned; the whole being thus made to flow around and by the current from the fire chamber, as the unequalizing and direct influence of the draft of the exit pipe is shut off by the disk being left entire in the part resting over the opening for said pipe."

Claim.—"What I claim as new, is concentrating the issue of the gases evolved during combustion, as they pass from the fire chamber into a reverberating chamber, and are at that

point commingled with jets of air, the said issue or orifice being in the proportion of a circle of one-third (or less) the diameter of the reverberating chamber into which it opens, and combined with an opening for the discharge of the reverberated current, as illustrated by the fire bowl, orifice, drum, and opening, and for the purposes set forth.

"I also claim the disk inserted immediately above, or on a level with, the top of the opening for the exit pipe, and having a central orifice of suitable diameter, and perforations, arranged as described, and for the purposes set forth.

"I also claim the disk, constructed as described, in combination with the orifice, as described, and for the purposes set forth.

"I also claim locating the opening for the exit pipe, as described, in combination with the disk and the orifice, in the manner and for the purpose set forth."

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75. For an *Improvement in Keeping Ledger Accounts;* Andrew J. Folger, Nantucket, Nantucket county, Massachusetts, October 30.

The patentee says,—"The nature of my invention consists in the construction and arrangement of an alphabet ledger in a novel manner and form, for the purpose of facilitating the work of reference to individual accounts in posting."

Claim.—"I claim the box with the plate or false bottom, constructed with the slits for the reception of the cards, the said cards being arranged with two alphabetical indices, arranged at right angles to one another, as a direct index reference to the name and surname of individuals with whom accounts are kept.

"I also claim the card index, formed with the shoulder to suspend the card in the slit of the plate or false bottom, and to form part of said card to pull it out and insert it in the slit, as described."

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76. For an *Improvement in Barrel Carriages;* William Furley, Smithsburg, Washington county, Maryland, October 30.

Claim.—"What I claim as my invention, is the combination of the arcs and hinged legs with a barrel carriage, substantially in the manner and for the purpose set forth."

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77. For an *Improvement in Mills for Grinding;* Lewis Fagin, Cincinnati, Ohio, October 30.

Claim.—"What I claim as new, is, 1st, surrounding the feeding tube and cup with a shield, constructed and attached as described, or in any analogous manner, and for the purpose described, viz., preventing the blast of air from disturbing the regularity of the feed, and deflecting and directing the same vertically downwards, so as to cause it to force the grain between the grinding surfaces of the stones.

"2d, Inserting and extending down into the eye of the runner a cylinder to which the balance rive is permanently attached or cast, (whether made with or without a metallic back and hoop for the stone,) attached at its upper portion to the stone, forming, with the eye of the runner-stone, at its lower portion, a recess into which the stationary cylinder of the bed-stone projects, and furnishing an attachment for the balance rives, elevated above the centre or face of the runner; the whole being arranged as described, or in any analogous manner, and for the purpose described, viz., preventing any grain jumping over the top of the stationary cylinder that stands on the bed-stone, and hanging against or choking the eye of the runner-stone, directing the air blast vertically downwards, in connexion with the cylindrical projection of the shield, and, most important of all, affording an attachment for the balance rive above the level of the grinding surface of the runner, thus leaving the same undiminished and unbroken, and avoiding the usual interference of the balance rive and driver with the feed, or its tendency to hanging in the eye of the runner-stone, if the stationary cylinder on the bed-stone is not used.

"3d, Attaching to the bed-stone a cylinder resting on suitable feet, and within the sweep of the eye of the runner, the cylinder or circular partition being of such diameter and elevation as fit it to project up into the recess formed by the eye of the runner-stone and the cylinder which is inserted and attached therein, and to allow the same to revolve around and within it; the whole being arranged as described, or in any analogous way, and for the purpose described, viz., preventing the grain coming into contact with, or being carried around by, the revolving runner, and thereby hanging in and choking the eye of the same, the grain not having the same tendency to hang on the vertical wall of a stationary cylinder, and also continuing the vertical and downward direction given to the blast until it escapes between the stones.

"4th, In combination with the closed air chamber for passing the blast between the stones, dressing the inner, and leaving without dress the outer, portion of the area or face of the

stones: say, from the circle described by the eye of the runner, dressing one-half of the radial distance, more or less, thence out, and leaving the balance all land.

"5th, The combination of the shield, the cylinder *n*, and the cylinder E, arranged and constructed as described, or in any analogous way, and for the purpose described."

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78. For an *Improved Weather Strip;* Ebenezer Garnsey, Watertown, Litchfield county, Connecticut, October 30.

Claim.—"I claim the hinge, constructed as set forth, in combination with the mode of stopping the same from shifting its position horizontally to the right or left hand when in ordinary use.

"I also claim the method of detaching the lower strip when desired, by the method described, in combination with the mode of keeping the lower strip suspended above the sill, as set forth."

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79. For an *Improvement in Planing Machines;* Jeter & Watson, assignees of Hugh Jeter, Lexington, Fayette county, Kentucky, October 30.

The patentee says,—"The nature of my invention consists in so arranging the springs which act upon the lumber in the machine, that they shall adapt themselves to its thickness, the pressure being light for thin boards, and proportionably heavy for thick boards or plank."

Claim.—"What I claim as new, is graduating the pressure applied to the lumber on the rest, in proportion to its thickness, substantially as set forth."

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80. For an *Improvement in Flour Packers;* Nathan Kinman, Buffalo, New York, October 30.

Claim.—"What I claim as new, is, 1st, the packing apparatus, consisting of a combination of the tube and inclined blades, for condensing the flour and retaining it while moving the barrel, substantially in the manner and for the purposes set forth.

"2d, I claim the hollow shaft, for expelling the air from the barrel in packing, as described. I also claim the self-acting clutch, in combination with the packing apparatus, in the manner made known."

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81. For an *Improvement in Fences;* Lucius Leavenworth, Trumansburg, Tompkins county, New York, October 30.

The patentee says,—"The nature of my invention consists in an arrangement of wire for connecting pickets or palings together, to make a fence for yards or fields, and of fastening the fence, so constructed, to posts set in the ground,—a method of making a fence which is strong, economical, and handsome."

Claim.—"What I claim, is the mode of fastening pickets or paling fences, by means of a series of links formed on the wire, for receiving and retaining the pickets, the ring for securing the wire to posts, and the hooks for connecting the pieces of wire together in a line of fence, in the manner substantially as herein set forth."

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82. For an *Improvement in Power Looms;* Roger Lightbown, Eaton, Madison county, New York, October 30.

The patentee says,—"The nature of my invention consists of the following improvements on the power loom, viz:—

"1st, Of an arrangement of a stop-rod, in combination with a lever or click, that operates on a cam on the fast pulley when the shuttle becomes accidentally entangled in the web and stopped in its passage, and instantaneously stops the driving shaft of the loom, thereby preventing smashes and breakages.

"2d, Of an arrangement of a spring attached to a treddle, in combination with a cam on the lower shaft of the loom, with fingers or arms on the ends of the stop-rod, and with fenders in the shuttle-boxes, whereby the velocity of the shuttle is checked as it enters the boxes, to prevent it from striking too forcibly against the pickers, while it offers no obstruction to the free passage of the shuttle when driven out of the boxes.

"3d, Of the construction and arrangement of two conical pulleys, in combination with a sliding wedge or inclined shoe, moved by a weight, and the pad-lever, in such manner as to regulate the motion of the warp-beam as the warp is unwound therefrom in weaving, and the size of the roll is diminished."

Claim.—"What I claim, is, 1st, the cam on the fast pulley, in combination with the lever

or click, the crooked rod, the coil spring, the catch, and the lever, constructed and arranged in the manner substantially as described, for the purpose of arresting the loom at pleasure, as herein set forth.

"2d, I claim the mode of stopping the loom instantaneously by a self-acting operation, when the shuttle gets caught in the race-way of the lathe, by means of the chisel, on the rod *e*, catching against the head on the crooked rod, and projecting the click or brake against the cam on the fast pulley, in the manner substantially as described.

"3d, I claim the combination of the vibrating lever or treddle, and the connected spring, with the cord or rod *f*, the vibrating fingers on the rod *e*, and the fenders for the purpose of arresting the momentum of the shuttle as it enters the boxes, the cam on the shaft operating and giving motion to the fingers, in the manner substantially as described."

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83. For an *Improvement in Stoves;* Adolphus Lotze, Cincinnati, Ohio, October 30.

Claim.—"What I claim as new, is attaching the exit pipe to the funnel-shaped tube or shute, so as to collect and transmit down into the fire the soot precipitated during the passage of the results of combustion to the exit pipe, substantially after the manner and for the purpose described."

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84. For an *Improvement in Mills for Grinding;* David Marsh and Eli B. Nichols, Fairfield, Fairfield county, Connecticut, October 30.

Claim.—"What we claim as new, is, 1st, the construction and application of the cup, with edges to receive the bail and spindle, preventing the ends of the spindle from separating, thereby forming a more permanent attachment to the bail.

"2d, The construction and application of the cylinder, with screw flanches outside and spiral plate inside, forming a screw to force the grain between the stones, and also to prevent its jumping out of the eye, as the running-stones and bail give the grain or other material a rotary motion against the direction of the stationary screw flanch, substantially as described."

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85. For an *Improvement in Washboards;* Orrin Rice, Cincinnati, Ohio, October 30.

The patentee says,—"The nature of my invention consists in the mode of manufacturing washboards out of metal and wood combined, by so preparing the sheet of zinc or other metal that, by sharpening two parallel edges, and crimping the sheet from one of these edges to the other, I am enabled, by using pressure, to incise and fasten to the wooden sides the sheet thus prepared."

Claim.—"What I claim as new in the mode of manufacturing washboards, is incising, with the edges of the sheet metal, prepared and crimped as described, the legs, or the legs and body-board, by the suitable application of pressure thereto, thereby fitting and attaching the one to the other at one operation, and with a comparatively water-tight joint."

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86. For an *Improved Means for Working Sails;* William A. Ross, Port Richmond, Richmond county, New York, October 30.

The patentee says,—"My improvement in, or addition to, the parts employed about the foresails of sloops or schooners, or the jibs of these or other vessels, or any other fore-and-aft sail, when the foot of the sail is stretched flat or straight by a boom, consists in the addition of a rope, so fitted that it prevents the sail from sticking or stretching, so as to tear at the diagonal line or point of shortest distance between the after end of the boom and the bolt rope of the sail, thereby facilitating the furling or stowing of the sail when lowered, and aiding in setting the sail when hoisted."

Claim.—"I claim as my invention, the attachment of a rope to the bolt rope of a sail, to act as a downhaul in lowering, and to sheet the sail home when hoisting, such rope passing by sheaves or blocks, or in any convenient manner, from one end of the boom to the other, so that it operates to release the cringle, and relieve the sail when lowering, and replace the cringle, and sheet home the sail when hoisting, substantially as described."

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87. For an *Improvement in Electro-Chemical Telegraphs;* Robert Smith, Blackford, Perthshire county, Scotland, and Alexander Bain, Beevor Lodge, Hammersmith, Middlesex county, England, October 30.

The patentees say.—"These improvements consist, 1st, in the peculiar mode of arranging

the several parts herein described of our marking instruments of our electro-chemical telegraphs.

"2d, In a mode of constructing a style or point-holder, so as to afford a ready and convenient mode of regulating the pressure of the style or point on the surface of the chemically prepared paper, or other suitable fabric.

"3d, In a mode of applying a weight for regulating the pressure of an upper on a lower revolving wheel or roller, in motion, so as to grasp the strip of chemically prepared paper, or other suitable fabric, and ensure its being drawn continually forward.

"4th, In a mode of arranging the marking instruments, keys, wires, and batteries, in a single circuit, and in branch circuits connected therewith, so that a copy of a message sent from any station, may be marked upon the chemically prepared paper, or other fabric, at any desired number of stations in communication therewith, and also, if required, at the transmitting station."

Claim.—"What we claim as new and of our invention, is, 1st, the mode of arranging the several parts of our marking instrument for electro-chemical telegraphs, substantially as described.

"2d, We claim the mode of adjusting a style or point-holder, as described, so as to afford a ready and convenient mode of regulating the pressure of the style or point upon the surface of the chemically prepared fabric.

"3d, We claim the mode of applying the weight for the purpose of regulating the pressure, as described.

"4th, We claim the mode of arranging the marking and transmitting instruments, wires, and batteries in a single circuit, and in branch circuits connected therewith, so that a copy of a message sent from any one station, may be marked upon the chemically prepared paper, or other fabric, at one or any desired number of stations in communication therewith, and also, if required, at the transmitting station, without requiring the use of any secondary current."

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88. For an *Improvement in Straw Cutters;* Jonathan Sullivan, Lexington, Davidson county, North Carolina, October 30.

The patentee says,—"The principle of this invention consists in using a series of circular knives or saws, arranged on an axle, as described. These knives may vary in size in different machines, from three to a greater number of inches in diameter; they are placed on the axle by means of holes through the centre of each, and at such distance apart as will cut the straw or other material of the required length: say one-half inch, more or less; on the axle, between the knives, are placed circular plates of wood or other substance, which are intended, by filling up the space between the knives to keep them firmly in position, their diameter being in all cases so much less than that of the knives, as to allow a projection of the knives beyond their verge to any required distance."

Claim.—"What I claim as my invention, is the operation of cuttting and comminuting straw, substantially as herein described."

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89. For an *Improvement in Springs for Carriages;* William S. Thomas, Norwich, Chenango county, New York, October 30.

Claim.—"What I claim as my invention, is the combination of the adjustable U-springs with the bent spring-reach, by bolting one end of said springs to said reach, and connecting the bend of said spring to the bent part of the reach by an adjustable link or clasp, in the manner and for the purposes set forth."

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90. For an *Improvement in the Mode of Making Toothed Cylinders;* John L. Tuttle, Lawrence, Essex county, Massachusetts, October 30.

Claim.—"What I claim as my invention, is the improvement in the mode of setting and adjusting the teeth of toothed cylinders, made substantially as described, the said improvement consisting in the employment of the screw, in combination with the external tube of paper or metal, the said screw not only enabling me to set the teeth in a helix line, which presents great advantages in their operation, but to readily withdraw it (the screw) at the proper time, and for the introduction of the cylinder, as described."

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91. For an *Improvement in Transverse Callipers;* William J. Van Ness, Baltimore, Maryland, October 30.

Claim.—"What I claim as my invention, is the transvers callipers, having legs so formed

and connected as to be inserted into the bung of a cask, to ascertain its length from head to head, or its width from side to side, substantially as described."

RE-ISSUES FOR OCTOBER, 1849.

1. For *Improvement in Power Looms for Weaving Plaids, &c.;* Erastus B. Bigelow, Clintonville, Worcester county, Massachusetts; patented April 10, 1845; re-issued October 9.

Claim.—"What I claim as my invention, is, 1st, regulating the delivery of the unwoven warps, as required for the weaving of the cloth, by the tension of the said warps, substantially as described, in combination with a brake or stop-motion, substantially as described, to prevent the tension given to the warps by the beat of the lay from affecting the delivery motion, as set forth.

"2d, I also claim, in combination with the method of regulating the delivery of the warps by their tension, and controlled by a brake, the taking up of the woven cloth by a regular and positive motion, substantially as described, that the figures produced thereon may be regular and well matched, the irregularities of the weft-threads being by this means taken up in the thickness instead of the length of the cloth.

"3d, I also claim, in combination with the roller of a positive and regular take-up motion of a weaving loom, the measuring wheel and hand or pointer, operated substantially as described, whereby the quantity of cloth woven is at all times indicated, as described.

"4th, I also claim communicating the shifting motion, for shifting the shuttle-boxes up and down when a change of color is required in the weft, by the gravitating force of a weight, or the equivalent thereof, substantially as described, whereby all injury to the mechanism is avoided should anything be interposed to arrest the motions of the moving parts, as described.

"5th, I also claim arresting the motion of the shuttle, and relieving the picker from the end thereof, preparatory to the shifting of the shuttle-boxes, by combining with the lay and picker a spring lever, one arm of which moves in a slot, or the equivalent thereof, to give it the required motion, substantially as described.

"6th and lastly, I claim stopping the loom, and arresting the momentum of the moving parts at a given and determined point, by means of a lever which, when the weft-thread is not carried through, is brought into contact with a spur on the crank-shaft, or the equivalent thereof, which forces it back to shift the belt; when this is combined with the fingers which enter recesses in the lay, and which, when the weft-thread is carried through, are pushed forward, to prevent the lever from stopping the loom, as described."

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2. For *Improvements in Looms for Weaving Brussels Carpeting, &c.;* Erastus B. Bigelow, Clintonville, Worcester county, Massachusetts; patented March 10, 1849; re-issued October 9.

Claim.—"What I claim as new, is guiding and supporting the pile-wires as they pass between the warps, by means of a guide or guides, through or on which the sail wires slide, as above specified, or in any other way substantially the same."

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3. For an *Improvement in Winnowing Machines;* John Thurston, Bath township, Franklin county, Indiana; patented January 6, 1848: re-issued October 9.

The patentee says,—"The nature of the first division of my invention consists in constructing the feeder with three or more successive slats or steps, each at an angle of about 20°, and having a free passage between each slat forming the same, for the escape of a portion of the blast of air caused by the fan, and in arranging and combining therewith, for the purpose desired, the parts attached to this slat feeder.

"The nature of the second division of my invention consists in constructing the separating riddle with a re-gathering and re-feeding shelf."

Claim.—"What I claim as new, is forming the feeder with slats one below the other in its bottom, and openings between them, the whole being made in this or any equivalent way, for the purpose described.

"I also claim the separating riddle, the shelf for re-gathering and re-feeding the grain and cheat, for the purpose described.

"I also claim giving the separating riddle and screen a rear vertical motion, in the manner and for the purpose described, whether the motion be given to each separately or conjointly."

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4. For an *Improvement in Seed Planters;* Moses and Samuel Pennock, East Marlborough, Chester county, Pennsylvania; patented March 12, 1841; re-issued October 30.

Claim.—"What we claim as our invention, is, 1st, the simultaneous throwing into and

out of operation, by the movement of a lever, or other mechanical equivalent or device, each seeding cylinder and its respective drill or seed-tube, for the purpose of sowing with any number of hoppers and drills that may be required in sowing point or other irregular shaped land, without stopping the animal or animals attached to the machine; not intending to limit ourselves to the particular construction described, but to vary these in any way that we may deem proper, so that the before described results are effected by means substantially the same as those described.

"2d, We also claim the arrangement of the spur wheels for the purpose of connecting the seed rollers and hoppers to the shaft, as before described, in such manner that they can be disengaged or engaged at pleasure, whilst the machine is in motion."

DESIGNS FOR OCTOBER, 1849.

1. For a *Design for Stoves;* A. Cox & Co., assignees of George W. Chambers, Troy, New York, October 9.
2. For a *Design for Stoves;* A. Cox & Co., assignees of George W. Chambers, Troy, New York, October 9.
3. For a *Design for Stoves;* S. H. Burton, Cincinnati, Ohio, October 9.
4. For a *Design for Stoves;* Sherman S. Jewett and F. H. Root, Buffalo, New York, October 9.
5. For a *Design for Stoves;* William Savery, City of New York, October 9.
6. For a *Design for Parlor Stoves;* J. Cross & Son, Morrisville, Madison county, assignees of Samuel W. Gibbs, Albany, New York, October 9.
7. For a *Design for Stoves;* Edwin B. Finch, Peekskill, Westchester county, New York, October 16.
8. For a *Design for Stoves;* James Wager, Troy, New York, October 23.
9. For a *Design for Parlor Air-Tight Stoves;* Moses Pond, Boston, Massachusetts, October 23.
10. For a *Design for Stoves;* Hosea H. Huntley, Cincinnati, Ohio, October 23.
11. For a *Design for Air-Tight Cooking Stoves;* John F. Rathbone, Albany, New York, October 23.
12. For a *Design for Wood Stoves;* John F. Rathbone, Albany, New York, October 23.
13. For a *Design for Air-Tight Cooking Stoves;* John F. Rathbone, Albany, New York, October 23.

The claims to the above are to the designs of ornaments, mouldings, scrolls, &c., as described in the several specifications.

MECHANICS, PHYSICS, AND CHEMISTRY.

Lecture on the Sciences as Applicable to Domestic Life, delivered at a meeting of the members and friends of the Retford Literary and Scientific Institution. By GEORGE CHAPMAN, ESQ.*

Continued from page 193.

A walk in the fields, whether they be clad in the russet livery of winter, or in the glowing tints of summer, is ever replete with subjects of meditation. Perhaps the first inquiry may be directed to the cloud of steam, which, as soon as we leave the warm atmosphere of the house, has become visible, issuing from our mouth and nostrils. Here we have an instance

* From the London Farmer's Magazine, for January, 1850.

similar to that mentioned in the bed-room, where the moisture occasioned by our breath was invisible till condensed on the cold window; whilst in the house our breath was not perceptible, the warmth being sufficient to keep it in a state of invisible vapor; but the cold air outside at once condenses it, and it becomes a cloud of steam. The hoar frost we see covering the trees arises from the same cause;—during the night a thick fog or vapor enveloped the earth, and towards morning a sharp frost setting in cooled every branch and spray, causing the vapor to condense and freeze upon them.

The earth, warmed by the heat of the sun, is constantly sending forth vast volumes of invisible steam or vapor, which may easily be proved by inverting a glass on the ground on a fine day, when, if the glass be kept cold, the inside will soon be covered with steam; indeed, the quantity is so great that 25 hogsheads of water will be evaporated from the surface of a square acre in 12 hours. It is this vapor, when condensed by any sudden change in the temperature, that produces fog. It may also be observed on a very warm day, producing a dazzling effect to the height of a few feet from the ground, resembling the vapor arising from a brick-kiln. It does not, however, appear to us in its moist form until condensed into dew by the chill of the evening.

Dew is, however, a very important natural phenomenon; and as it is the first and most gentle cause of the separation of water from the atmosphere, it is worthy of a good deal of attention. The subject of dew, and of the "dew-point," or degree of temperature at which the atmosphere begins to part with moisture in the form of dew, collected upon surfaces with which it is in contact, are very important ones in the science of the weather. If the temperature is reduced to about 6° below the mean temperature of the place, the season, or the day, as the case may be, the air immediately in contact with the surface of the ground is no longer able to take up the vapor that radiates from it, or even to retain the whole of that with which it is already charged.

It was long a question, whether dew descended from the atmosphere or ascended from the earth; though, in strict language, dew can neither be said to ascend nor to descend, yet the water of which it is formed may be afforded by the earth, by the rain, or by both, the last of which is, I believe, pretty generally the case; still, however, there is a little vagueness in the theory, inasmuch as the electric state of the atmosphere may, and must, have some effect upon the formation of dew, and this is an effect which cannot easily be estimated. Looking at the facts, however, which are our best guides in such cases, we find that there is the greatest disposition to the formation of dew when the difference of temperature between the day and the night is the greatest. There is a greater proportion of solar heat reflected from the earth when the sun is near the horizon; the withdrawal of the reflection acts almost immediately after the sun sets; and so this cause, acting alone, or being the predominant one, occasions an evening dew, which forms in greatest quantity early in the night.

There is, however, another means of cooling the lower stratum of the air, the result of which is a dew which forms later in the night. This is produced by what may be called a night cooling of the air, arising not from the withdrawal of the sunbeam, but from the escape into the upper regions

of the air of that heat which radiates from the earth during the absence, as during the presence of the sun. If the air is clear: that is, free from clouds, this heat finds its way to an indefinite elevation, because the diminished density of the atmosphere offers less and less resistance to it as it ascends higher and higher. If, however, the atmosphere is clouded, the clouds arrest the upward progress of the radiated heat, and the retention of its action below the clouds prevents the lower atmosphere from tending to the requisite degree below the mean temperature for forming dew. Hence it is only in very particular states of the atmosphere that a thickly-clouded sky is attended with any formation of dew; and one may often observe that, when the night sets in cloudy and afterwards clears up, the ground will remain perfectly dry so long as the clouds are undissolved, but that a heavy morning dew will form after the sky becomes clear. Whatever increases the tendency of the air to receive the vapor of water must counteract the formation of dew; and hence there is seldom much dew in windy nights, even though the sky is without a cloud.

Dew, as we have now noticed, may be considered as the most perfect species of surface-clouds: that is, of clouds produced by the states of the earth and atmosphere at their immediate point of contact. But the formation sometimes extends to a moderate height in the air, and appears there in the state of visible vapor, or in what may be called a ground-fog. These ground-fogs are chiefly formed along the valleys of rivers which are surmounted by more elevated and exposed grounds. The cold wind from the latter descends after the diurnal influence of the sun upon it has ceased, and diminishing the capacity of the whole for moisture, produces a stratum, a sort of fog, which fills the hollows like water, and remains in the morning until it resolves into vapor by the heat of the sun. Such ground-fogs are more common in the autumnal months, but they appear even in summer in those situations where the formation of dew is frequent and copious. Sometimes the warmth and resistance of the earth are so great that there is less formation of dew accompanying the ground-fog than when no fog is apparent; and the electric state of the atmosphere is often so peculiar, that these fogs scarcely moisten a substance exposed to them, and thus they are what are called "dry-fogs."

That evaporation produces cold may be immediately proved by moistening the palm of the hand and exposing it to the wind, when cold will be very sensibly felt; and the more so if we use a volatile fluid, such as sal volatile or spirits of wine, the greater rapidity with which they evaporate producing a greater degree of cold. It is from this reason that remaining in wet clothes is so dangerous; the evaporation that takes place during the time they are drying, carries away so large a portion of heat from the body as almost certainly to induce cold, and all the thousand diseases will follow in its train. When a person is obliged to remain in wet clothes, the best method to adopt is to prevent evaporation by covering them with a mackintosh, or any other garment which will best keep in the moisture; and if this is effectually done, the person will feel little inconvenience from his damp clothes; the warmth of the body will soon communicate itself to the damp garments under the mackintosh, and as the steam cannot escape through it, there is nothing to produce a greater degree of cold than if the garments had been dry.

We may often observe, on a fine clear day, that the sky becomes suddenly overcast, and we wonder from whence the clouds have come; now this is most probably the effect of a sudden change of temperature, which has condensed and rendered visible, in the form of clouds, that vapor which before was floating unperceived in the atmosphere.

Southerly winds commonly bring rain, because, being warm, and replete with aqueous vapors, they are cooled by coming into a colder climate, and part with some of their vapor, which is precipitated in the form of rain; whereas, northerly winds being cold, and acquiring additional heat by coming into a warmer climate, are ready to absorb more vapor than they before contained, and therefore they are dry and parching, and commonly attended with fair weather.

Snow is nothing more than rain congealed in the higher regions of the atmosphere, before it has become dense enough to be formed into drops; and hail is rain, which, during its descent, and after having been formed into drops, passes through a stratum of very cold air which transforms the drops into ice. This cold stratum is often the result of an electric state of the atmosphere, and is frequently accompanied by storms of thunder.

The formation of ice, as it shoots its long, needle-like crystals from the margin of a shallow pool, is a very beautiful phenomenon, which, however, may be more agreeably examined at the fire-side by mixing a handful of salt in a dish of snow—the mixture producing extreme cold. If a saucer, partly full of water, be placed in the dish containing the salt and snow, it will rapidly congeal, even in a warm room, the only difference being that the crystals will shoot more from beneath than they would have done in a pond, from the freezing mixture being placed below the saucer.

Water is subject to a remarkable anomaly. There is a point in its temperature, about 40° in our common thermometer, at which it is most dense or compact, and from which it expands in heating till it becomes steam, and contracts in cooling till it becomes ice, which takes place at 32°. This is a beautiful provision of nature. By being less dense than water, ice floats on the top, and, by forming a hard crust, prevents the mass of cold liquid beneath from being greatly affected by the intensely cold atmosphere. Thus the lower stratum in lakes and rivers continues to maintain a temperature from 6° to 8° above the freezing point, and in this comparatively warm stratum fishes dwell as usual.

The boiling point of water is not fixed and definite like the freezing point. It is 212° at the level of the sea; but, in consequence of the diminished pressure of the atmosphere, becomes lower as we ascend, till, on a summit 15,780 feet high, it is 180°; at the bottom of a mine 1650 feet below the level of the sea, water will boil at 216°.

It is through this liquid that all the active functions of vegetable and animal life are carried on. It is water alone that can act as the solvent for the various articles of food which are taken into the stomach, the gastric juice itself being nothing else than water with a small quantity of animal matter and a little acid, which form with the albumen, &c., of the food, new compounds that are capable of being dissolved in that liquid. It is water that forms all the fluid portions of the blood, that vital fluid which penetrates the minutest textures of the body, and conveys to each the appropriate materials for its growth and activity. It is water which, when

mingled in various proportions with the solid matter of the various textures, gives to them the consistency which they severally require. And it is water which takes up the product of their decay, and conveys them, by a most complicated and wonderful system of sewerage, altogether out of the system. No other liquid naturally exists in the animal body, save the oily matter of fat. It might be inferred, then, that water, in addition to properly selected articles of solid food, would constitute all that the wants of the system can ordinarily require; and there is abundant evidence that the most vigorous health may be maintained, even under very trying circumstances, without any other beverage.

"He that gives his mind to observe," says Bacon, "will meet with many things, even in vulgar matters, worthy of observation." Many of the operations of the kitchen are conducted on solid philosophical principles; but there is one of which the benefit is less apparent, although, from the universality of the practice, one is inclined to fancy there must be some advantage derived from it. I allude to the custom of placing an inverted cup in a fruit pie, as the cook will inform us, to contain the juice while the pie is baking, and prevent its boiling over; and she is the more convinced in her theory, because, while the pie is removed from the oven, the cup will be found full of syrup. When the cup is put in the dish it is full of cold air, which will expand by the heat in baking, driving out all the syrup and a portion of the air it contains, in which state it will remain till removed from the oven, when the air in the cup will condense and occupy a very small space, leaving the remainder to be filled with syrup; but this does not take place till the danger, of "boiling over" is past. If a small tumbler is inverted in the pie, its contents may be examined into whilst it is in the oven, and what has been advanced will be found correct.

In the manufacture of bread, the most curious part of the process is the action of the yeast. Flour contains a small portion of saccharine matter, the addition of yeast to which produces fermentation in the same manner that it does in brewing; during the fermentation carbonic acid gas is evolved. Now the glutinous nature of the dough will not allow this air to escape, but we find it pervading the whole mass in minute cells or bladders, forming it into a light spongy substance. The warmth of the fire has a double action, first, by increasing the inclination to fermentation, and secondly, by expanding the air in these small bladders, rendering the paste still more porous. The use of yeast, then, is to render the bread light by separating its particles. Knowing this, it is not difficult to substitute some other material to produce the same effect when yeast cannot be procured, and none is more efficient and simple than the mixture of muriatic acid and carbonate of soda, in such proportions as to neutralize one another when they form that useful article salt. The addition of this acid to a solution of carbonate of soda gives out carbonic acid gas; and as this mixture takes place in the dough, the gas pervades the whole mass in the same manner as if formed by the yeast. Ropy bread is generally admitted to depend on the presence of fungi; an eminent modern chemist ascribes its cause mainly to the yeast, aided by a particular state of atmosphere.

From a microscopic examination of yeast, it is found to consist of minute disconnected vesicles, that appear to constitute one of the simplest forms of vegetation. These, like seeds, may remain for any length of time in an

inactive state without losing their vitality; but when placed in a fluid where any kind of sugary matter is contained, they commence vegetating actively, provided the temperature be sufficiently high; and they assist in producing that change in the composition of the fluid, which is known under the name of "fermentation." If a small portion of the fermenting fluid be examined at intervals with a powerful microscope, it will be observed that each of the little vesicles, at first contained in it, puts forth one or more prolongations, which in time become new vesicles like their parents. These organs perform the same office, so that in a few hours the single vesicles have developed themselves into rows of five or six. Sometimes also the vesicles burst and emit a number of minute globules which are the germs of new plants, and which soon develop themselves into additional cells. By the time that five or six vesicles are found in each group, the fermentation is sufficiently far advanced for the purposes to which it is to be applied, and measures are then taken to check it, by which the vegetation of the yeast-plant is checked. Suppose, then, any circumstance to arise by which the vegetation of the yeast was checked, and the yeast amalgamated with the flour, for the vegetation again to become active, you will have a sufficient cause for the origin of fungi in bread.

The art of brewing, again, is based upon chemical data, and will bear the test of philosophical inquiry. Fermentation here is also the most important phenomenon, as the agent which transmutes the sugary principle of the malt from a mere syrup, as it may be considered when in the first state of sweet wort, into a spirituous liquor. A weak solution of sugar will of itself ferment, if kept in a warm place, as will also the sugar contained in grapes, and the saccharine matter of malt. In a general view of fermentation, therefore, we will leave out the small quantity of yeast employed, because it is not absolutely necessary, but seems merely to render the effect more rapid, and thus to prevent the change of the liquid into acidity. In complete fermentation the sugar disappears altogether, and two new substances are found in its place—carbonic acid and alcohol. The former escapes whilst the beer is left open, which may be easily tested by holding a lighted candle near the surface of a tub of beer whilst at work, when it will be quickly extinguished, proving also the deadly nature of the air. The alcoholic parts remain in the liquor. If too much of the carbonic acid is driven off before the cask is bunged down, the beer will become flat, and will be a long time before it acquires briskness. The use of hops in beer, besides the flavor they communicate, is to render it clear, and also a preventive to its becoming acid.

Atmospheric pressure is the weight of the air resting on the surface of the earth. Air extends to a height of many miles above the earth; and although but a light fluid, yet so great an altitude of it must be of considerable weight. Were we to take a square tube, one inch in diameter, and so many miles high as to reach to the top of the atmosphere, the air in that tube would weigh about 15 lbs.; therefore, every superficial inch of the earth's surface is pressed upon by a weight of 15 lbs. Now air, being a fluid, presses in all directions alike; consequently, every surface which is exposed to its action, whether it be horizontal or perpendicular, is subject to this pressure. If we place our hand over the open receiver of an air-pump, and exhaust the air from beneath, we should very quickly be made

painfully sensible of this pressure. But a more simple experiment, to show the weight of the atmosphere, may be made in the following manner: Fill a wine-glass with water, and cut a piece of writing paper nearly to fit the top of the glass; lay the paper on the glass, which should be quite full; then placing the palm of the hand over the paper, gently invert the glass, and hold it bottom upwards. The hand may then be removed, and the paper will be pressed against the mouth of the glass by the atmosphere, so as to prevent the water from escaping.

The common pump is a most useful application of this pressure to domestic purposes. As before stated, every inch of surface supports a weight of 15 lbs. Now if we can remove this 15 lbs. from one inch of the surface of the water in a well, whilst we allow the pressure to remain over the other part, it follows that the water will be forced up in the part from which the pressure is removed; and if the water so forced up be enclosed in a tube an inch square, we shall find that it will rise in this tube till the quantity contained in it will weigh 15 lbs., which would require an altitude of 33 feet, the weight of water in the tube being equal to the weight of air on a similar surface of water in the well. The pump is an instrument for removing this pressure of the atmosphere from the pipe. Every time the piston is raised it lifts the weight of the atmosphere resting upon it, removing its weight from the water in the pipe; the water from the well, therefore, follows up the pipe to fill the parts from whence the pressure is removed, and there is a valve or small door at the bottom of the pipe, which prevents the water returning into the well as the piston descends;—every fresh stroke of the pump is followed by a fresh supply of water.

The foregoing example of atmospheric pressure seems naturally to lead us to the barometer, an instrument contrived for the purpose of ascertaining the variations of this pressure; for though we have stated it at 15 lbs. per inch as its mere weight, it is subject to constant variation with every change of its atmosphere. The barometer is a glass tube about 33 inches long, filled with quicksilver, and inserted in a cup containing the same, the air being allowed to press on its surface, as it did on the water in the well—the weight of air being removed from the quicksilver in the tube by the upper end being closed. The mercury will now be supported in the tube to a height equivalent to the weight of the atmosphere. This, as before stated, requires 33 feet of water; but as mercury is 33½ times heavier than water, it will rise about 30 inches only. When the atmosphere is heavy it presses with more force upon the surface of the mercury in the cup, forcing it higher up the tube; whereas, when the atmosphere is light, the pressure is relieved and the mercury falls.

There can be no doubt that the primary agent in the production of these atmospheric fluctuations is heat. This influence, from various causes, is very unequally distributed. It affects the weight of the atmosphere by expanding its volume. When this spreading takes place in the air over any particular part of the earth's surface, the diminished pressure on the exposed portion of the mercury in a barometer will, of course, be shown by the diminished elevation of that in the tube. But it will occasion other effects also in the air itself. The more condensed air from distant places will soon begin to rush with more or less violence towards the situation of diminished pressure: in other words, wind will occur. But the increase

of heat has also been occasioning a more rapid and plentiful evaporation of moisture from the earth, which, rising into the air in the form of invisible vapor, has of course produced more than the usual accumulation there; and is, therefore, ready to fall again to the earth as soon as the reduction of temperature has taken place. Hence, in such circumstance, the occurrence sometimes of mist or dew, at other times of rain, or snow, or hail. The process, in short, is this: The heat operating in the air, dilates it, diminishes its weight, and consequently lowers the mercury in the barometer; operating upon the terrestrial moisture, raises it by evaporation into the air, which soon becomes charged with more than its usual humidity. Then come the wind, the fall of temperature, and the rain, &c. A fall in the barometer, accordingly, is found by experience to be, in general, an indication of all these coming changes. By inverting an empty wine-glass into a tumbler of water, and forcing it down, the air in the wine-glass will prevent the water from entering it more than a little way up the mouth, thus showing the power of resistance the atmosphere is capable of exercising, a fact we are apt to lose sight of from the ease with which we move about in it. It is upon the principle of air excluding the entrance of water that the diving-bell is constructed.

The effects of the pressure of water was very curiously exemplified a few years ago, by some gentlemen who were trying experiments on water brought from different depths of the ocean. For this purpose they corked up and lowered an empty bottle into the sea, imagining that, when the pressure was sufficient, it would force the cork into the bottle, and that the bottle would fill so as to bring them a specimen of water from that depth; but what was their surprise on finding it still corked although full of water! They conjectured that the water had forced its way through the cork; and to prevent this, they sealed the cork of the next bottle. On pulling this up, however, the mystery was solved,—the bottle was found to be full and corked, as before, but the cork was reversed, and forced into the neck of the bottle with the sealed end inside. This curious fact was thus accounted for: As the bottle descended the pressure drove the cork in and filled the bottle; the weight of the sealing-wax on the top of the cork caused it to reverse its position, and float with the sealed end downwards. When the bottle was drawn up, the pressure being diminished, the water, or perhaps more properly speaking, the small portion of air contained in the water, expanded, and forced the cork again upward into the neck of the bottle. All this appears simple enough when explained, but it required a good deal of consideration on the part of those who first witnessed the experiment.

Early in my paper I drew your attention to certain objects of interest occurring in a morning walk. It was my intention to have closed it by noticing a few of the phenomena observable during a stroll on a summer's evening, such as the refraction of the rays of light, in connexion with the setting sun, our lengthening shadows, which source would have suggested a cursory remark or two on the cause of lunar eclipses. Then the cause of, and various circumstances attendant upon, thunder storms, might have been not inaptly introduced, which again would have naturally led to the subject of "sound." But having already reached the prescribed limits as to time, I must bring my notes to a hasty conclusion.

The acquirement of knowledge consists in the registry of *facts* in the mind ready to be applied as they may be required; and it is this faculty of applying facts thus gained in the brain which constitutes wisdom. Bacon has justly observed that, "the man who writes, speaks, or meditates, without being well stocked with facts as landmarks to his understanding, is like a mariner who sails along a treacherous coast without a pilot, or one who adventures on the wide ocean without a rudder or a compass." The mere possession of knowledge may be only the work of a good memory, and serve but little purpose without wisdom to apply it to good account. It may be compared to a huge folio volume without an index, full of valuable information, but useless to its possessor at the moment it is required, from the want of arrangement and the means of arriving at its contents. To those who pass through the world, as many do, without a wish even to increase their knowledge, or to examine into the wondrous works of nature, satisfying themselves with the opinions of others, seeing with other men's eyes, and reasoning with other men's faculties; to such persons I would say, in the language of Locke, "that he who examines, and, upon a fair examination, embraces an error for the truth, has done his duty more than he who embraces the profession of the truth without having examined whether it be true or no." Nor need we fear that a man of an inquiring mind will ever be puffed up with vanity and self-conceit; for the more he sees and observes, the greater will his admiration of the goodness of his Creator become, and the more humble his opinion of himself, because he is always reminded that his faculties are finite, whilst the God whose works he studies is infinite.

The lecturer having concluded, a vote of thanks was unanimously given to Mr. Chapman, for the very able and comprehensive manner in which he had treated his subject.—*Derbyshire Courier.*

Report made to the Committee of the Blockley Almshouse, on Warming and Ventilating the Lunatic Asylum, (Female Department.) By Birkinbine, Martin & Trotter, *Philadelphia.*

Gentlemen: In compliance with the resolution passed by your Committee, February 13th, 1850, and communicated to us by your Secretary, we would submit the following Report on Warming the west half of the Lunatic Asylum of Blockley Almshouse by steam, and Ventilating the same, which we have just completed.

The main features of the arrangement are the same as those embodied in our plans submitted to your consideration in February last. Much difficulty was experienced in the adaptation of an old edifice, not originally designed for such a system as has been adopted, and which added greatly to our labor, and made it more difficult to effect our purpose.

In constructing the heating chambers and necessary flues, we were obliged to cut through a system of arches, which, on account of the substantial manner in which the building was constructed, added greatly to the expense and time attending the prosecution of the work. The want of proper flues and conduits for the warmed and extracted or foul air, all of which we were obliged to construct or alter to answer the purpose of

the present arrangement; the insufficient height of the cellar ceiling for our purposes, and the impossibility of going any deeper on account of water, presented another serious difficulty in the great distance the steam has to be conveyed, and the condensed water returned again to the boilers, being 500 feet; a greater depth would have facilitated the return of the condensed water.

Running underneath the building are a number of sewers, into which the sinks are drained, consequently making them very foul. These made a system of ventilation very desirable, but at the same time greatly interfered with our efforts to produce a pure atmosphere throughout the building. The building itself is one very difficult to warm, on account of the great height of the ceilings, the first story being 14 1/2 feet, the second 16 1/2 feet, and the third 14 8/2 feet in height. The number and large size of the windows making the glass surface equal to 3447 square feet, and the imperfect fitting of the windows, together with the large size of the doors, and the very exposed situation of the building, render it, perhaps, more difficult to warm than any of the buildings connected with the Institution.

Our contract with you was closed on the 13th day of February, 1849, when we immediately commenced the necessary excavations and cuttings. The work was continued without interruption (except when the cholera was raging in the house) until the fire was made, on the 26th day of October last. The apparatus has warmed the building to the present time, nor has the fire ever been drawn out.

By the assistance of the accompanying drawings you will more readily understand the arrangement of the building, and the warming and ventilating apparatus.

Fig. 1, Plate III., is a plan of the west half of the Lunatic Asylum; the main building, running east and west, is 168 feet long by 59 feet wide, inside measurement; three stories high, with an attic. On each floor of the main building there is a large hall running the length of it, a stair-way, kitchen, dining-room, and three large associate rooms, in each of which there is a nurses' room, wash-room, and water closet.

The wing at right angles to the main building is 119 feet long by 46 feet wide, inside measurement; three stories high, with an attic. On each floor of the wing there is a hall running the length of it, and connected with the main building by another hall; two stair-ways, a nurses' room, a bath-room, two associate rooms, and twenty cells.

Great pains have been taken to procure air for the supply of the house from pure sources, and to keep it from being contaminated while in the equalizing and heating chambers under the building. The arrangements are such that the patients cannot interfere with them in any way; there are no valves in any of the flues except those in the hall, nor have they been found desirable, as there is but a trifling difference in the temperature of the different parts of the house, thus avoiding the consequent annoyance from interference with them.

The heating chamber, (A A, fig. 1,) for warming the main building, runs along the centre of the cellar, until within 23 feet of the wing, where it was found necessary to stop on account of a sewer crossing it at right angles. For warming the halls in the main building, another chamber (B) is contructed. For warming the cells and halls in the wing, the heating chamber (A′) runs the length of the wing, at right angles to the main

chamber. For warming the associate and nurses' rooms, the chambers (A″ A″ A″) are constructed.

The air for supplying the main building is drawn from the garden on on the south side into equalizing chambers, (L L L,) and from thence through the small apertures (O O O, &c.,) in the bottom of the chamber wall, as indicated by the arrows, (fig. 4,) into the heating chamber (A), where it is heated, and then distributed through the flues (F F F, figs. 3 4 and 5,) into the different parts of the house to be warmed.

The air for supplying the cells and halls in the wing is drawn from the enclosure on the west side of the building. It is received into a shaft (S) sufficiently high to be beyond the reach of the patients who may be exercising in the yard;—conveyed down this, and through a tunnel 50 feet in length, into the heating chamber (A′), where it is heated, and from thence distributed into the cells and halls.

The associate rooms in the wing receive their supply of air from the garden, and the nurses' rooms from the yard. Their arrangements for the equalizing and heating chambers, flues, &c., are the same as the others.

The arrangements by which the heated air is introduced, and the foul air extracted from the rooms, will be understood by referring to figs. 3, 4 and 5, which represent the arrangement for warming and ventilating three of the large associate rooms in the main building, which are each 47 by 44 feet. The flues (F F F) lead from the heating chamber (A) to near the ceiling in the centre of the rooms; these supply the heated air for warming the rooms, throwing it out in the directions as indicated by the arrows.

The foul air is drawn off by means of the foul air flues (V V) placed in the sides of the rooms, opposite to the entrance for warm air; they open close to the floor, thus producing a downward ventilation. Through these it is conducted to the main foul air flue (K K, fig. 4, 5); from thence conducted to the extracting shaft (E), which is 90 feet high, fitted with a cast iron chimney (P), 30 inches diameter and 25 feet high, through which the smoke and gases from the fire are discharged. The extracting shaft is also fitted with a steam jet, by means of which additional force can be given to the ventilation if it should be desirable. There is also a small furnace in the base of the shaft, so arranged as to produce ventilation when the heating apparatus is not in use.

The main sewer, which runs under the building, is so connected with the fire under the boiler that the necessary air for supplying the furnace may be drawn from it, thus creating a current of air into the sewer, and, in a measure, preventing the escape of fetid gases.

G G, figs. 1 and 2, are two cylindrical boilers, 36 inches in diameter and 40 feet long, having a capacity, together, equal to 565 cubic feet. We would here assure you of the perfect safety of these boilers. They are constructed of the best Pennsylvania iron, by experienced workmen, and are of unusual thickness; the heads, although of cast iron, are concave; the boilers weigh together 12,186 lbs.; the great amount of water they contain, and consequently the amount of time necessary to evaporate it, makes them safe as regards explosion from the most frequent cause, the want of water; and their proportion in relation to the fire and radiating surfaces is such, that, were the safety valves chained down, it would be impossible to generate a pressure of 100 lbs. to the square inch. With the present weight at the extreme end of the safety valve levers 72 lbs. pressure would raise

them. The boilers will sustain a pressure of 300 lbs. to the square inch without any danger; 30 lbs. is the greatest pressure under which the apparatus is generally worked.*

The smoke and gases from the furnace are conveyed through the smoke flue (D, figs. 1 and 2,) within the heating chamber (A), until it is opposite the extracting shaft (E); from here it is conducted across and into the cast iron chimney (P) within the extracting shaft (E). The smoke flue within the heating chamber (A) is covered with cast iron plates, and these with clean sand. The arrangements are such that the temperature of the smoke and gases is reduced below 200° Fahr. before they are permitted to escape; thus preventing any unnecessary waste of heat, and consequently of fuel.

To the boilers are connected, by means of a 6-inch cast iron main (R), systems of radiating pipes (*h h h*) of wrought iron, $\frac{3}{4}$-inch inside diameter; they are distributed through the different heating chambers (A A′ A″, &c.) These systems are so arranged that the condensed water is returned to the boilers, to be again converted into steam, thus producing a circulation. There are between 8000 and 9000 feet of radiating pipe distributed through all the heating chambers.

If a rapid circulation through the radiating pipes is desired, for the purpose of raising the temperature of the building in a comparatively short time, it is effected by opening a blow-off cock which discharges into a sewer, or by means of a steam pump, so arranged as to take the water from the condensed water pipes and force it into the boilers. This pump is also used for supplying the boilers with water when the pressure of steam is too great to do so from the reservoir.

In the third story of the wing is an iron tank, of a capacity of 1200 gallons, in which the water for washing and bathing purposes is heated by means of a coil which is supplied with steam from the boilers (G G), a distance of 200 feet.

The boilers also supply the steam for cooking the food for the inmates. In the kitchen are two boilers of 95 gallons each, and one of about 50 gallons; in these the food is cooked. The kitchen in the eastern or male part of the house is arranged in the same way. They are all supplied with steam from the same source.

There is no fire in the west half of the Asylum excepting under the boilers (G G), and a small cooking stove for preparing food for the sick.

The cubical contents of the building warmed, without deducting partition walls, stair-ways, &c., is 780,000 cubic feet; the amount actually warmed by the apparatus, deducting partition walls, stair-ways, &c., is 730,000 cubic feet, or 90 rooms and 6 halls.

The consumption of fuel in cold weather is $1\frac{1}{2}$ tons of coal per day (24 hours); allowing 75 days cold and 100 days moderate weather through the winter, the consumption would be 213—say 225 tons; 30 tons of this should be deducted, which is the amount used in cooking, and 15 tons of this should be charged to the eastern or male part of the house. The consump-

* Plain cylinder boilers are always preferable to tubular boilers where there is room enough to make them sufficiently large,—they can be made stronger on account of their form; they have, also, more steam and water room. The boiler of a first class locomotive, of ordinary construction, will generate enough steam, when the fire is in full operation, to fill the steam space in four seconds; and enough, could there none escape, to burst the boiler in about ten minutes;—they will evaporate the water so as to become dangerous in from 30 to 60 minutes when the supply of water is stopped.

tion of fuel, as near as we can ascertain, for heating this part last year, by close stoves, &c.,—and there was no ventilation—was from 275 to 300 tons of coal—say 275 tons—when but a portion of the rooms were warmed, and that imperfectly;* while, by the arrangement introduced by us, the whole of the building is warmed at a saving of at least 75 tons of coal, which, at $4 per ton, would be $300.

The advantages of the present arrangement are,—

1st, Producing a pure atmosphere throughout the building, the air being supplied in great abundance from pure sources, and so arranged as to keep it from contamination.

2d, A system of downward ventilation, which diffuses the warmth uniformly throughout the various apartments; the air being admitted near the ceiling and drawn off at the floor, is constantly sinking, and in this way the colder and impure air passes off by the foul air flues, and is ejected from the extracting shaft above the building.

3d, The safety from fire, both in the building and as regards the patients, which, in a Lunatic Asylum, is a very important consideration.

4th, The freedom from noise, dust, and dirt, usually attendant upon fires in grates and stoves.

5th, The whole heating arrangement being under the care of a single individual, is more easily managed than by a number of attendants, who are now dispensed with.

6th, The economy of the arrangement, saving about 25 per cent. in fuel;—the repairs will not exceed those of stoves and grates.

Explanation of Plate III.

Fig. 1.—Plan of Building, and Warming and Ventilating.
Fig. 2.—Elevation of Heating Chambers.
Fig. 3.—Longitudinal Vertical Section of the Arrangement for Warming and Ventilating.
Fig. 4.—Plan of a part of the Heating and Ventilating Chamber.
Fig. 5.—Elevation of Fig. 4.

Philadelphia, February 26, 1850.

For the Journal of the Franklin Institute.

Accident on Board the Steamer "Niagara," at Bridgeport, Connecticut.

Report of a Committee of the "Wacamahaga Club."

Your Committee, to whom was referred for examination the cause of the recent accident on board the steamer "Niagara," at Bridgeport, have performed the duty assigned them, and Report:—

That the accident which occurred was a separation of the main steam

* Some idea may be formed of the imperfect manner in which it was heated last year, by the following situation of the wing:—

Feb. 17, 1849.—At 9 o'clock, A. M., towels froze directly after washing the patients.
At 2 o'clock, P. M., thermometer stood at 28° in the building.
During the night, thermometer stood at 32° in the building.

Feb. 19, 1849.—Three feet from the stove, the thermometer stood at 32°.
At 9 o'clock, A. M., thermometer stood at 28° in the light cells.
At 2 o'clock, P. M., the same.
At 7 o'clock, P. M., the time for putting the patients to bed, the thermometer stood at 30°.

By the present arrangement in the same wing,—

Feb. 6, 1850.—At 9 o'clock, A. M., outside 16°, inside 62°.
12 " M. " 15°, " 60°.
3 " P. M., " 15°, " 60°.

Before the arrangements for this wing were entirely completed.

Fig. 1.

Plan.

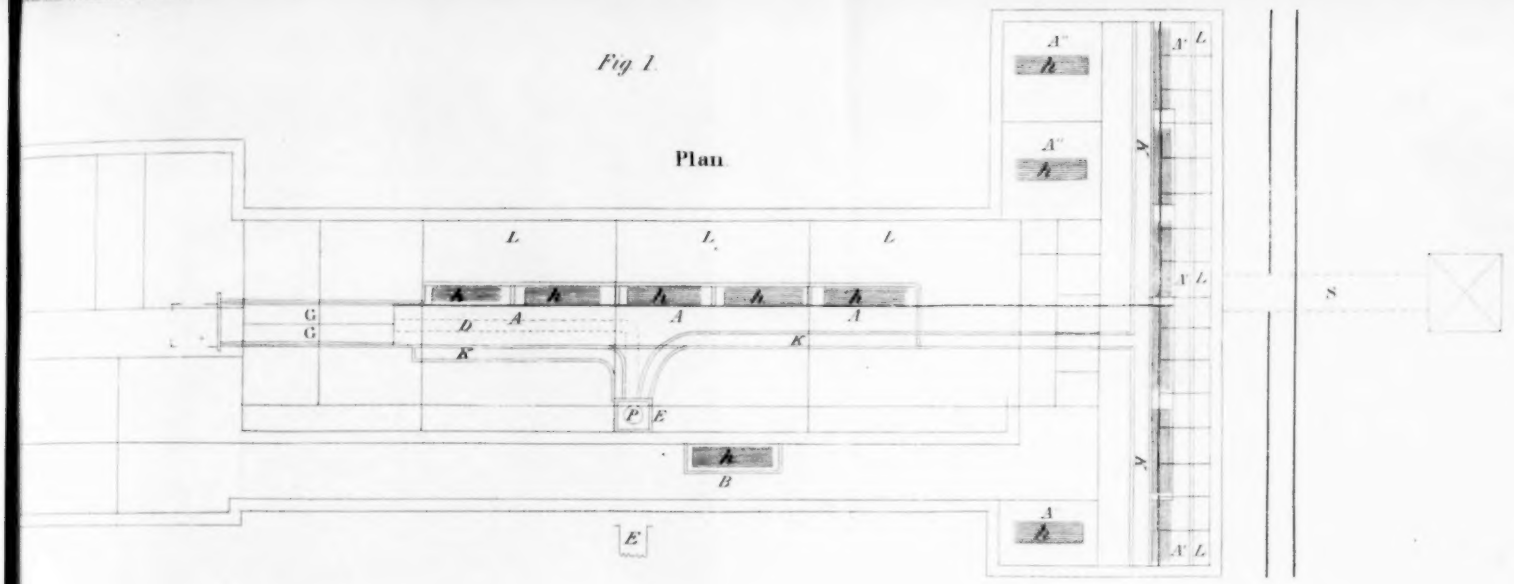
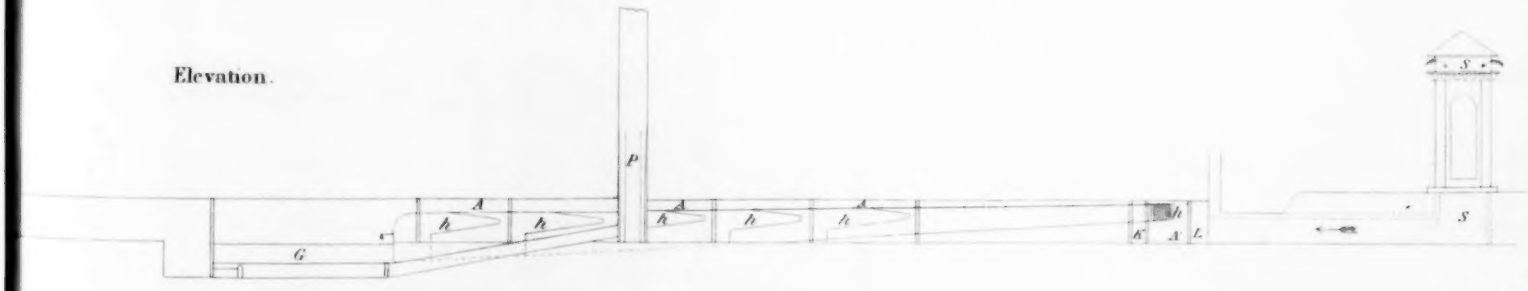
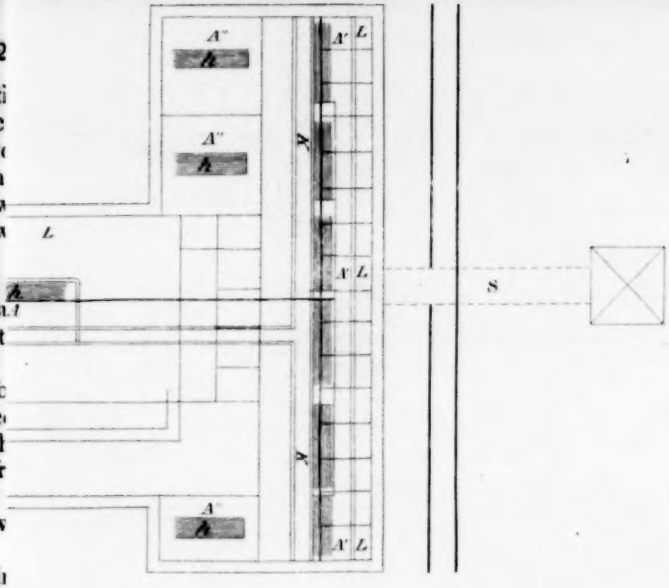


Fig. 2.

Elevation.

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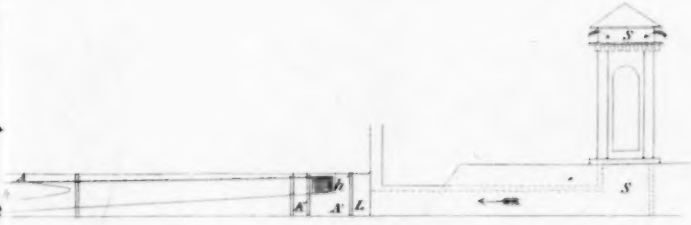
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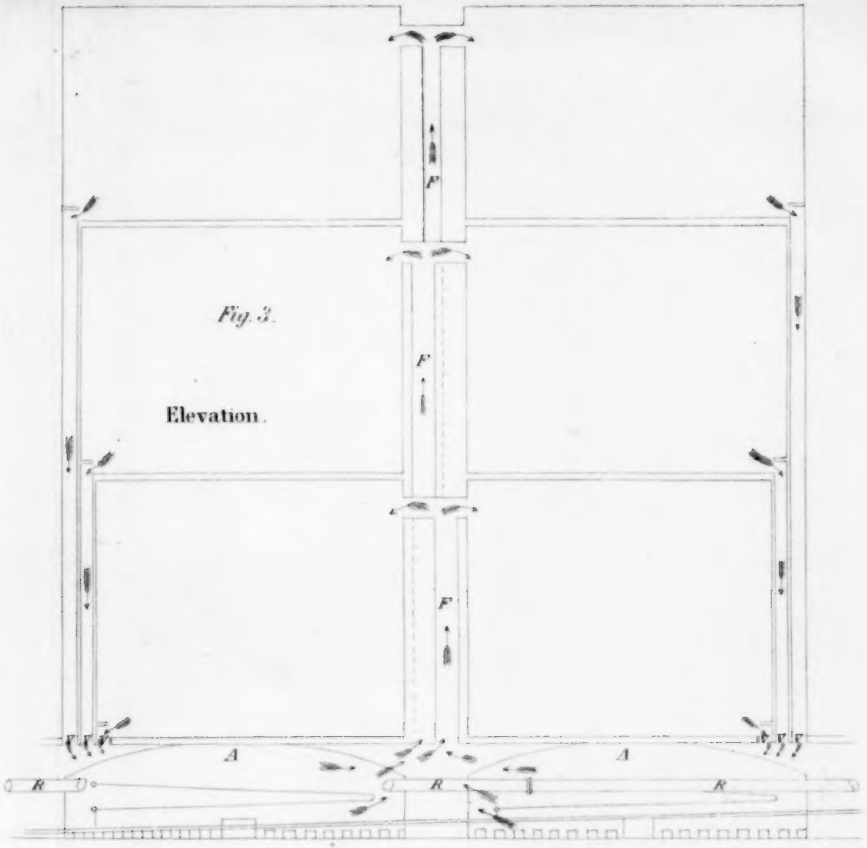


Fig. 3.

Elevation.

Plan. *Fig. 4.*

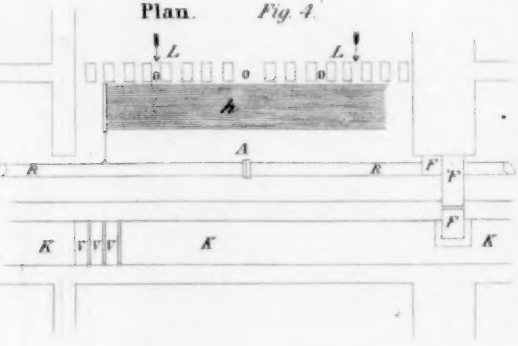
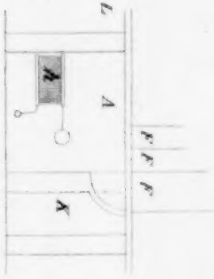
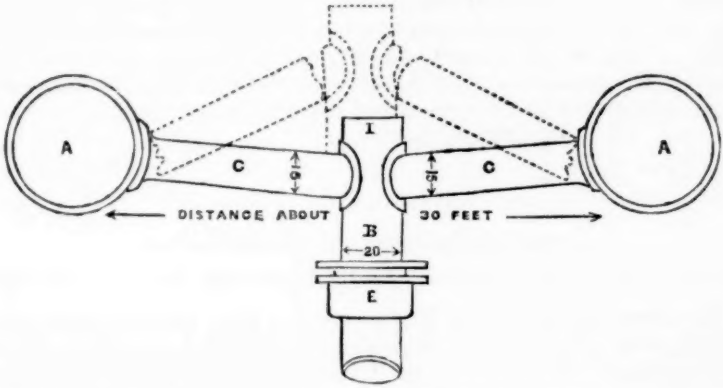


Fig. 5.



pipe at the "slip-joint," whereby the whole quantity of steam, and a large portion of the water contained in the boilers, was discharged upon the upper or hurricane deck of the boat. The subjoined sketch shows the arrangement of the pipes, and will aid in explaining the cause of the accident.



The two boilers are upon the guards of the boat, and their steam chimnies are represented at A A, the distances asunder being about 30 feet; the main steam pipe, B, is about 20 inches diameter, and the branch steam pipes to the steam chimnies about 15 inches diameter. The slip-joint which separated is represented at E.

The branch steam pipes, C C, ran nearly in a direct line across the vessel, but having a slight angle towards the engine, as shown in the sketch. When the accident took place, the pipes were thrown forward, and the flanches were torn asunder, as shown by dotted lines.

It is understood that, at the time of the accident, there was a pressure of about 20 lbs. per square inch above the atmosphere upon the boilers, and there was no provision whatever to guard against the action of the steam upon the end of the main steam pipe at I, other than the stiffness of the cross pipes C C, and the friction of the slip-joint itself. The pressure upon the end of the pipe, tending to separate the slip-joint, at the pressure named, (20 lbs.,) is $20^2 \times .7854 \times 20 = 6283$ lbs., and with 40 lbs. pressure per square inch, would be 12,566 lbs. The last named pressure has often been carried upon the boilers of our steamboats, and it is fair to infer that this pressure might at times have been carried upon these boilers.

We have already observed that the only resistance to this pressure of 6283 lbs. was the stiffness of the pipes, and the friction of the packing in the slip-joint; but it is also to be remarked that the accident occurred directly after raising steam in the morning, and it is probable that the packing of the slip joint had not yet expanded by heat and moisture, so as to produce the usual amount of friction, and hence the only resistance to this pressure, at that time, was the stiffness of the cross pipes, and this we consider quite inadequate for safety.

In conclusion, we would state that we consider the accident attributable entirely to a want of some guard against the reacting pressure upon the

main steam pipe, other than the stiffness of the branch pipes, and are of the opinion that this oversight shows a want of thought on the part of those fitting out the boat.

It is with pleasure that your committee state that no person was seriously injured.

The committee are cognizant of other accidents having occurred by the separation of slip-joints in a similar manner, by which there has been loss of life. They would earnestly call the attention of engineers to the necessity of greater caution in guarding against accidents of this character than is generally shown in the arrangement of pipes on board steamers.

By order of the Club.

OTIS, *Secretary.*

Translated for the Journal of the Franklin Institute.

Effects of Atmospheric Electricity upon the Wires of the Magnetic Telegraph.

The *Revue Scientifique*, for December last, (*Tom.* XXXVI., *p.* 436,) contains an interesting article by M. Baumgartner on the subject of the effects of atmospheric electricity upon the wires of the magnetic telegraph. The following are the most interesting of his results:

1. The needle rarely coincides with the point which is determined by its astatic state and the tension of its suspension thread; almost always it deviates more or less from this point; which proves that it is influenced by an electric current.

2. The variations are of two kinds; there are some which reach 50°, others extend over ½° or 8′. The first are less frequent; they differ so often in direction and intensity that it is impossible to deduce a law for them. On the contrary, the small deviations appear connected by a very simple law.

The observations made at Vienna, and at Gratz, appear to shew that, during the day, the electric currents move from Vienna, and from Gratz, to Semmering, which is more elevated. This direction is inverse during the night. It appears that this change of direction takes place after the rising and setting of the sun.

3. The regular current is less disturbed by the irregular currents when the air is dry and the sky is serene, than when the weather is rainy.

4. In general, the current is more intense with short than with very long conductors; often, even, the current of the longer chain is opposed to the current of the shorter chain.

Where there is a difference of intensity, this difference is far greater than that which could originate from the resistance of the longer conductor.

When the sky is cloudy, and the weather stormy, there are frequently observed in the electric conductor, currents which are sufficiently intense to affect the telegraphic indicators, which are, however, far from having extreme sensitiveness.

When they were placing the conducting wires of the Northern Telegraph line, from Vienna, the workmen frequently complained of a kind of spasms which they felt in handling the wires. These spasms ceased as soon as they took the precaution not to touch the wires with naked hands.

These spasms were most frequent and intense in Styria, the highest region of the line. Thus, near Kranichfeld, a workman received a shock sufficiently violent to overturn him and paralyze his right arm.

The action of the atmospheric electricity on the telegraphs is stronger on the approach of a storm, and not unfrequently the wires themselves, and the poles which support them, are destroyed by electric discharges.

M. Baumgartner cites several examples in support of what has just been said. On the 17th August, 1849, a storm which had burst forth at Ollmutz extended to Frielitz: that is to say, to a distance of 10 miles. A workman employed at this latter station, in putting up the wires, experienced a shock which overturned him, and he experienced a real burn of the fingers which touched the wire. At this time the sky was perfectly serene at Frielitz.

For the Journal of the Franklin Institute.

Steamers "Ohio" and "Georgia."

In a late number of the Journal, I gave all the particulars of the steamer "Ohio," running in Laws' Chagres Line from New York; and I then stated that the "Georgia," then unfinished, would have a duplicate set of engines and boilers, but the model would be quite different. That difference and its advantages I will now show.

	Ohio.	Georgia.
Length on deck,	247 ft. 10 in.	248 ft. 8 in.
Breadth of beam,	45 7	48 8½
Depth of hold,	24 6	25 6
Midship section from stern-post on 16 ft. water line,	122 0	104 9
Draft with engines on board, and boilers filled with water,	13 10	12 0
" with 500 tons coal in,	16 6	14 0
" with 200 tons freight, with water and stores for voyage,	17 2	
" with 771 tons coal in, and 200 tons freight, and stores and water for the voyage,		16 3

From the above it is readily seen that, carrying 271 tons more coal, the "Georgia" draws 11 inches less water, while, in speed, she is acknowledged to be the fastest vessel. By carrying her midship section aft, they have been able, notwithstanding her increased width, to get easy lines forward, while her after lines are not made too full. B.

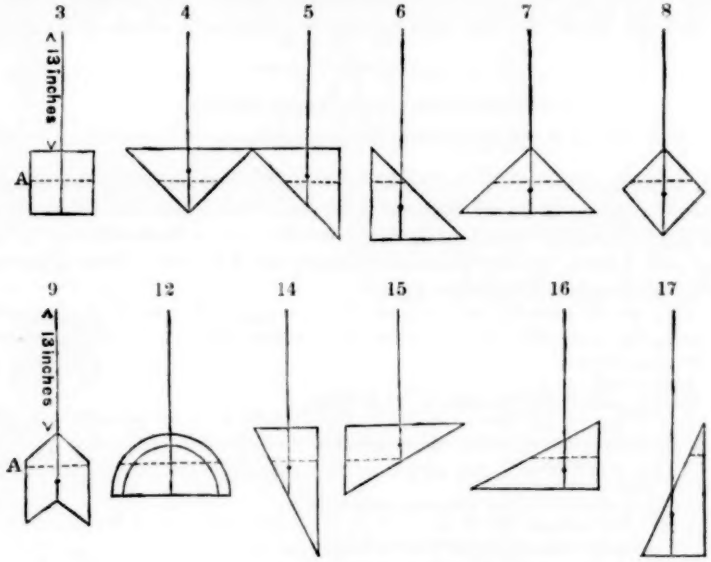
For the Journal of the Franklin Institute.

Remarks on T. Ewbank's Experiments on Paddle Wheels.

In the January and February numbers of the Journal, 1849, Mr. Ewbank published the result of his experiments on paddle wheels, and deduced therefrom certain theories in relation to them, which, to me, appeared so erroneous that, in the March number, I stated my objections. Since then, Mr. Ewbank has become Commissioner of Patents, and, in his annual report, has introduced the same experiments with the same conclusions. As I differ with him entirely as to the results obtained, it is my present pur-

pose to again recur to his experiments, and to prove (in my own opinion at least) that whatever the experiments made by Mr. E. do demonstrate, it is not the advantage of using triangular paddles. I wish here to be understood that I do not assert that no advantage will be gained by their use, if properly made, but simply to show that the result of the experiments made by him was to prove that the wheel having the largest effective diameter (both making the same number of revolutions) had in all cases the advantage.

These diagrams give nearly all the experiments of Mr. E., those left out not being important. I have affixed the same numbers to the paddles, to



prevent confusion in referring to the original article. No. 3 was the trial paddle, and was 7 inches square. In *all* these experiments, the paddles had the same area, (49 inches,) and the *inner* edge of all the paddles was the same distance (13 inches) from the centre of motion. The wheels were both attached to one shaft, and made the same number of revolutions, the paddles of the trial wheel were No. 3, and they remained unchanged throughout the experiments. The dotted line, A, shows the centre of the trial paddle, and the small dot in the other paddles shows their centre, and the difference between the two can readily be seen.

Mr. E. remarks that Nos. 4 and 15 were unable to compete with No. 3; No. 5 was slightly superior to No. 3, and the superiority of all the rest was very evident; and he then adds that it is made manifest by paddles 7, 12, and 16, (when 4 paddles were found equal to 8 of No. 3,) that *triangular* paddles, having equal *area* and *dip*, may be rendered *twice* as effective as the ordinary rectangular one. I think it will be evident to all who read this article, that it is not necessary to experiment in boats to prove the superiority of Nos. 7, 12, and 16; the effective diameter of No. 7 is

35 inches, and of No. 16 is 36 inches, being 2 and 3 inches greater than No. 3. Mr. Ewbank must be well aware that each of his paddles said to be superior to No. 3, from the increased diameter of their effective centres, would require more power; and it yet remains to be demonstrated that triangular paddles have any advantage over the ordinary rectangular form.

As to reducing the number of paddles, every engineer, for the past 20 years, has been well aware that they could take out one-third or one half of their paddles, and go as fast as with them all,—perhaps in some cases faster; but the present number is used to produce a uniform and regular motion to the vessel. But, even in this respect, Mr. E.'s experiments do not justify *his* conclusions, for, in all his experiments, the best result was obtained with EIGHT paddles; the distance from centre to centre was but about 12 inches, while in all steamboats it exceeds 3 feet. He says that 4 paddles of Nos. 7, 12, and 16, were equal in effect to 8 of No. 3, but at the same time he shows that 8 of either of those kinds was superior to 4.

No. 12, in his experiments, is not correctly described, for he says it has the same dip as No. 3, and is a semicircle. If so, it would be one-half of a 14-inch circle, and contain 72 instead of 49 inches; and if, as I suppose, it contained but 49 inches, and was still a semicircle, it is shown by the inner line, and is one-half of a $11\frac{5}{16}$ circle. B.

For the Journal of the Franklin Institute.

Steamship "Baltic."

This vessel, the fourth of Collins' Line of Liverpool Steamers from New York, was recently launched from the yard of Jacob Bell. Her dimensions are are as follows:

Length on deck,	285 feet.
Breadth of beam,	46 "
Depth of hold,	32 "

She is to have two side lever engines, with cylinders of 95 inches diameter, and 10 feet stroke.

Translated for the Journal of the Franklin Institute.

Process of Engraving upon Ivory.

The process used to cover ivory with ornaments and designs in black, consists in engraving in the ivory itself, and then filling in the designs with a black hard varnish.

To obtain finer and more regular designs, the ivory is to be covered with the common ground, and by means of the point the designs are engraved upon it. They are then eaten in by a solution formed as follows:

Fine Silver,	6 grammes.
Nitric Acid,	30 "
Distilled Water,	125 "

At the end of about a half-hour, according to the depth to be given, it is to be washed with distilled water, and dried with bibulous paper. The

design is then exposed for an hour to the solar light, and the layer of wax is removed by essence of turpentine.

The design has then a black color or a dark brown, which blackens entirely at the end of one or two days. Other colors may be produced, by replacing the solution of nitrate of silver by a solution of gold or platina in aqua regia, or of copper in nitric acid.—*Revue Scientifique*, xxxv, *p.* 433.

For the Journal of the Franklin Institute.

Steamship "Atlantic."

This is the first of Collins' Line of Liverpool Steamers, and she is now rapidly approaching completion. Steam was first applied to her engines on the 2d inst., and they were found to be all right. Much credit is due Messrs. Stillman, Allen & Co., of the Novelty Works, by whom the machinery has been constructed; it has every appearance of strength, and is exceedingly well finished. The engines are of the side lever arrangement, with cylinders 95 inches diameter, 9 feet stroke.

Translated for the Journal of the Franklin Institute.

Memoir on the Perturbations Produced in the Vibratory Movements of a System of Molecules by the Influence of another System. By M. Augustin Cauchy. *(Academy of Sciences of Paris, Jan.* 14, 1850.)

There is, perhaps, no student of the present day who has carried his mathematical speculations farther, or has been more happy in their application to physical phenomena, than M. Cauchy. In the memoir whose title is given above, after recalling to the minds of his fellow academicians the differential equations which he had deduced for the expression of the conditions of equilibrium and motion of a system of material points, (equations which he had shewn to be applicable to the theory of elastic bodies and of sound, in 1827, and had applied to the phenomena of light in 1829,) he has now conceived the case of a homogeneous system of atoms, brought into presence of another system, also homogeneous among themselves, but differing from the first, and has proceeded to investigate their material influence.

After developing the mathematical conditions of the atoms, he proceeds as follows:—"Starting from this principle, we see that the actions exercised upon the atoms of the ether, (the medium by the vibration of whose particles the phenomena of light are supposed to be produced,) by the molecules of bodies, produce in the vibratory movements of the luminous fluid perturbations similar to those which the movement of a planet around the Sun undergoes, by virtue of the action exerted upon it by another planet. Let us enter into some details upon this subject.

"If a single planet be supposed to move around the Sun, the orbit which it will describe will be a plane curve, an ellipse in which the radius vector, drawn from the planet to the Sun, will describe areas proportional to the times. This ellipse may, moreover, in certain circumstances, be reduced to a circle, or flattened indefinitely."

"If, now, we suppose a second planet moving around the Sun, it will produce, in the movement of the first, inequalities or perturbations of two kinds, to wit, periodic inequalities, which will disappear at equi-distant epochs without modifying the elements of the ellipse described, and secular inequalities, which will sensibly alter the elements of the elliptical movement."

"Now these different phenomena are re-produced on a small scale in the theory of light. Let us consider the vibratory movements of the ethereal fluid. If this fluid be isolated, its vibrations may be represented by linear equations with constant coefficients, and then each molecule will describe a plane curve. In the most frequent case this plane curve will be an ellipse, and the radius vector drawn from the centre of the ellipse to the molecule of ether will describe areas proportional to the times. We shall then get what is called *elliptical polarization*. This ellipse may, moreover, in particular cases, transform itself into a circle or flatten itself indefinitely, so as to be reduced to its major axis, and then the elliptical polarization will be transformed into *circular* or *rectilinear* polarization. We may add also, that, in every luminous movement which is not extinguished for increasing values of the time, or of the distance from a fixed plane, the ellipses described by the different molecules of the ethereal fluid will be all similar, and comprised between parallel planes."

"Now let us conceive that the ether set in vibration is enclosed in another body, for example in a crystallized medium. The curves described by the molecules of the ether will be still nearly plane curves, and even ellipses. But the elements of the elliptical movement will be no longer the same as in the case where the ether was isolated. Besides, the perturbations produced in the elements of the elliptical movement will be of two kinds. The one analogous to the periodic inequalities of the planetary motions will be themselves periodic; only they will be represented by periodic functions, not of the time, as in astronomy, but of the coordinates of the atom. If, moreover, the vibratory movement of the ether is not one of those which are destroyed by the increasing values of the time, or of the distance from a fixed plane, then, in passing from one atom to another, two elements of this vibratory motion will remain invariable, viz., *the length of a luminous undulation*, or, in other words, *the breadth of a plane wave*, and *the time of vibration*. As to the perturbations which are not periodic, they will be analogous to the secular variations of the planetary movements, and will alter the two elements of which we are speaking."

"I will add here an important remark. The greater part of the phenomena which the theory of light presents, as, for example, the propagation of luminous waves in singly or in doubly refracting media, the dispersion of colors produced by the prism, the diffraction of the rays transmitted through a small opening, the reflection and refraction produced by the surface of a body, may be deduced from the integration of the linear equations with constant coefficients; and, in truth, I had already succeeded not only in deducing them, but also in determining from the calculus the laws of these phenomena, with such success that the predictions of the analysis have been heretofore confirmed by experiment. There were, nevertheless, some other phenomena remaining unexplained, particularly the chromatic polarization produced by certain liquids, such as the oil of turpentine and

tartaric acid, or by these liquids solidified, as the beautiful experiments recently performed by M. Biot shew. Now the principles which I have first laid down permit me to connect these remarkable phenomena with the direct actions exercised by the molecules of the bodies upon the atoms of the ether, and with a particular distribution of these atoms, determined by these same actions. This I will explain more in detail in another article."

"I will remark, in conclusion, that the same principles also furnish the explanation of the difference which exists between the velocity of sound given by the Newtonian formula and the velocity derived from experiment."*

For the Journal of the Franklin Institute.

Experiments on Paddle Wheels.

The experiments being made on board the steamboat "Penobscot" with concave paddles, and alluded to in the last number, have been continued. So far, the new paddle is 10 per cent inferior to the old rectangular floats taken off.

Report of the Explosion of the Locomotive Engine "Boston," on the Saratoga and Schenectady Railroad.†

The report of the explosion of the locomotive engine "Boston's" boiler having reached the Schenectady Locomotive Works, Monday, 11th inst., at 2½ o'clock, P. M., Messrs. E. S. Norris, A. Thompson, E. Caldwell, and myself, set out for an examination of the engine.

Proceeding to the spot where the explosion had taken place, we found the engine upset on the foot of the embankment, the dome turned towards the track. The waist or cylindrical part of the boiler was found to be completely blown out, whilst the whole fire-box, dome, and furnace, to all appearances, have received no injury whatever. The frames, braces,

* This latter explanation has already been arrived at by Prof. Challis, by the more rigid establishment and solution of the differential equations of vibratory motion. *See Lond. Edin. and Dub. Phil. Mag., Vol.* XXXIV. *p.* 353.

M. Cauchy then proceeds, in the remainder of this and in a subsequent communication, to develop the mathematical analysis upon which these curious analogies are formed. The nature of the discussion prevents us from following him in this part of his labors, but we extract from the second article (21st January) the following paragraph, developing the meaning of that which we have just quoted:

"Consequently, in order to explain this rotatory power of certain singly-refracting media, it is not necessary to have recourse to certain hypotheses imagined by different authors or by myself, nor to introduce into molecular mechanics forces which are polarized: that is, which are variable according to the directions in which they act, nor ternary actions. It is sufficient to admit that an atom of ether being brought into the presence of an atom of a body, these two atoms exercise upon each other an action which is proportional to their masses, and to a function of their distance, and to join to this hypothesis of a binary action between the atoms of the ether and of the body, the supposition of a special arrangement of these latter atoms. Among the conditions which this arrangement must satisfy, is that which physical philosophers and mineralogists admit, and the beautiful experiments of M. Pasteur demonstrate, that the crystalline form of a given singly-refracting body, cannot be superposed upon its image seen in a mirror." Ed.

† From the American Railroad Journal, March 30, 1850.

connecting-rods, in short, all the parts connecting the front part with the back part of the engine, are torn asunder, and all the tubes, as well as the steam-pipe, are torn out of the front tube-sheet, which, under the violent strain, assumed a concave shape, and was partly rent from the waist of the boiler to which it had been riveted. The first sheet, next to the throat of the fire-box, is ripped open and bent back, so as to enter the furnace from below the grate-bars; the upper part has been completely torn from the seam, leaving a small band forming the lap behind. Thirteen copper tubes have been turned over near the furnace flue-sheet, to which they are still fast, in such a manner that they cover the left side of the fire-box.

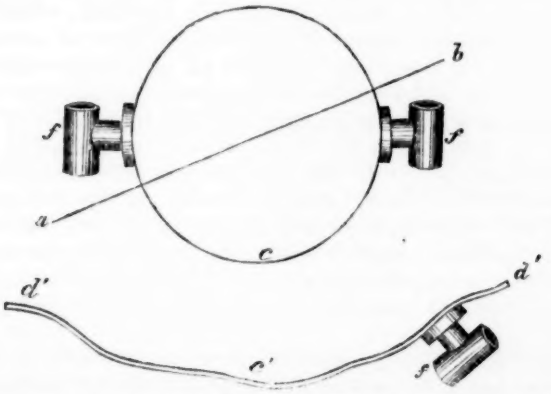
All these facts show that the seat of the explosion was in the waist of the boiler. An examination of the fragments conclusively proved this to be the case. The part of the waist to which the check-valves are attached is severed in two halves. One of these, with the left hand check and a boiler-brace still fast to it, was found about 10 yards back of the engine, at a small distance from, and on the left side of, the track; the other was thrown to the right side, and fell down a precipice forming the bank of the river on that spot.

An examination of the first fragment elicited the following facts:

1st, The rupture had taken place in a line *a b* passing nearly through the centre of the boiler, and being slightly inclined to the horizontal line.

2d, The line of rupture was irregular, partly following the seams of the boiler, and partly ripping the boiler plate.

3d, The fagment C, which was the one nearest to the embankment, had assumed the shape represented in the diagram at C′.



4th, Both extremities of that sheet, *d d′*, show distinctly the dull bluish-gray color of iron having been nearly red-hot, the inside being quite free from sediment.

5th, The brass check *f* still fastened to the end *d*, by its color, presents the appearance of polished brass after exposure to a temperature of fluid lead, or, as it is called, a black heat.

6th, The ends of the stud-bolts, by which the check is fastened to the boiler, show on the inside the appearance of having been exposed to nearly a red heat, the sediment with which such bolts are invariably found to be

covered has partly peeled off, and shows the gray color of iron which has been heated.

The above facts irresistably lead to the conclusion that the water, at the time of the explosion, was below the centre of the boiler, (which exactly coincides with the centre of the checks,) in consequence of which, the parts situated above the centre must have been overheated. The injection of the first jet of cold water, under such circumstances, must have caused instantaneous explosion, so quick indeed, that the explosive effect could only act on the vicinity of the checks, which clearly accounts for the fire-box not having been injured at all.

Mr. Blackburn, superintendent of motive power on the Utica and Schenectady Railroad, who arrived at the spot shortly after ourselves, and also undertook a very careful examination, was led to the same conclusion. Indeed, the nature of the evidence furnished by the inspection of that one fragment, was such that it could hardly fail to bring conviction, as to the cause of the accident, to the mind of any intelligent and reflecting observer.

The dusk of the evening not permitting a more minute examination of the furnace, I returned the following morning to the spot. By this time the fragments spoken of above had been removed from the premises. The other piece, with the opposite check-valve attached to it, still occupied its position on the bank of the river, and showed, as I am informed by Mr. Blackburn and others, who had examined it, less indication of heat than the one examined previously, inasmuch as only one bolt presented a blue color without sediment, the other bolts still being enveloped in sediment. The check presented also a paler color.

I then proceeded to examine the furnace flue-sheet, which, along the upper rows of tubes presented the gray appearances of heated iron, the sediment having to a great extent peeled off, bringing the clean surface of the iron into view. The upper tubes, especially those that had been turned over, showed an appearance strikingly different from the lower ones, inasmuch as they were entirely free from mud and sediment, and exhibited a perfectly clean surface. Mr. Blackburn remarks particularly, that the parts of the tubes that were found lying on the snow, or appeared to have come in contact with moisture, presented the appearance of copper heated till nearly red, and then being plunged in water. Mr. Case, who has been engaged for years in making and repairing tubes, pronounced the upper tubes of this boiler to have been overheated, though not enough to anneal the metal.

As an additional fact, going far to prove the overheated state of the boiler at the time of the explosion, it may be mentioned in this place, that fragments of the casing—easily identified as such—have come to hand, which were almost completely turned to charcoal. Now it is a well known fact, that the jacket of a locomotive boiler, under ordinary circumstances, will be slightly charred on the inside, so as to assume a dark brown color. In the present instance, the outside of the wood showed the appearance which might have been expected on the inside, whilst the inside was completely black and partly burnt off.

I shall content myself with having given, in the above, a truthful record of circumstances as they came to my cognizance, mostly through my own

observations, and partly by comparing notes with other reliable observers, especially Mr. Blackburn, to whom great credit is due for his most careful, dilligent, and unprejudiced investigation of the circumstances attending the lamentable catastrophe, and I shall only add that, in considering all facts enumerated above, I can only come to the conclusion that the primary cause of the accident was a want of water in the boiler.

H. BACMEISTER.

Schenectady, March 13, 1850.

I concur in the above statements in every particular, and also pronounce it as my opinion, that the throwing of cold water on the heated surfaces of the metal, which heat was produced by a low state of the water, was the cause of the explosion. VINCENT BLACKBURN.

It is my opinion, as above stated, that the upper tubes of the boiler of engine "Boston" were over-heated, though not enough to anneal the metal. LEVY CASE.

I fully concur in the statement of Mr. Bacmeister, and his opinions.

ALFRED THOMPSON.

We the undersigned, having seen and examined the wreck of the engine "Boston," do agree with Mr. Bacmeister's statement, and fully concur in his opinions.

E. CALDWELL,
THOMAS CONLON,
MAXWELL COX.

Translated for the Journal of the Franklin Institute.

On a New Sugar Homologous with Grape Sugar. By M. AUG. LAURENT.

This substance, which the author proposes to call "*Dulcose*," comes from Madagascar. Its origin is not well known. It crystallizes in oblique rhombic prisms, has a slight sugary taste, and when thrown upon incandescent charcoal diffuses the same odor as sugar. When deprived of its water by fusion, is composition is $C_{14} H_{28} O_{12}$

From which, by baking, $C_{2} H_{4}$

We shall have $C_{12} H_{24} O_{12}$ Grape Sugar.

When re-dissolved in water, it absorbs 3 atoms.

Like grape sugar, it plays the part of a feeble and polybasic acid, giving, with baryta, a well crystallized salt, $C_{14} H_{24} Ba_{4} O_{12} + 14$ Aq. (By the exchange of 4 H for 4 Ba.)

By nitric acid it is transformed, like milk sugar, into mucic acid. According to Biot, it exercises no influence on polarized light; and according to Soubeiran, does not undergo the alcoholic fermentation.—*Comptes Rendus de l'Academie des Sciences, de Paris, tom.* XXX *p.* 41.

FRANKLIN INSTITUTE.

Proceedings of the Stated Monthly Meeting, March 21st, 1850.

Samuel V. Merrick, President, in the chair.

Thomas Fletcher, Vice President.

Solomon W. Roberts, Corresponding Secretary.

Isaac B. Garrigues, Recording Secretary.

John F. Frazer, Treasurer.

The minutes of the last meeting were read and approved.

A letter was read from Prof. A. D. Bache, accompanying a donation of Maps of the Coast Survey.

Donations were received from Prof. A. D. Bache, Washington City, D. C.; Hon. Jos. R. Chandler, U. S. Congress; Prof. E. Horsford, Cambridge, Mass.; John McRae, Esq., Charleston, S. C.; T. H. Forsyth, Esq., and W. H. Souder, Esq., Pennsylvania Legislature; E. M. Stanton, Esq., Major Hartman Bache, Prof. John C. Cresson, Solomon W. Roberts, Esq., R. A. Tilghman, Esq., Robert Dyball, Esq., Prof. J. C. Booth, and I. W. P. Lewis, Esq., Philadelphia.

The periodicals received in exchange for the Journal of the Institute were laid on the table.

The Treasurer read his statement of receipts and payments for the month of February.

The Board of Managers and the Standing Committees reported their minutes.

The following Standing Committees reported their organization, by appointing their Chairmen, and fixing the time for holding their stated monthly meetings:

Committee on Meetings,	Geo. W. Smith,	Chair'n,	2d Monday	Evening.
" *Library,*	W. S. Levering,	"	2d Tuesday	"
" *Exhibitions,*	John Agnew,	"	2d Friday	"
" *Meteorology,*	John Simmons,	"	2d Friday	"

The Board of Managers reported that they had elected Mr. Samuel Hufty Chairman, and fixed the 3d Wednesday evening of each month for holding their stated meetings.

Mr. Wm. D. Parrish read a Memorial to the Senate and House of Representatives, together with the draft of a law, on the subject of Stationary Steam Engines and Boilers, prepared by the Committee on Science and the Arts.

On motion, the Officers of the Institute were instructed to sign the memorial, and forward it, with the draft of the law, to the Legislature.

On motion of Solomon W. Roberts, it was

Resolved, That the President of the Franklin Institute be requested to address a letter to the Secretary of the Executive Committee of "The Great Exhibition of Industry of All Nations," intended to be held in London in 1851, requesting him to transmit to the Institute any circulars or other information in his power to send, in relation to the time when the Exhibition will be opened, and the regulations under which it will be held.

A letter was read from W. Parker Foulke, Esq., declining his appointment on the Committee on the Cabinet of Minerals and Geological Specimens, which was accepted, and Richard A. Tilghman, Esq., was appointed to fill the vacancy.

New candidates for membership in the Institute (3) were proposed, and those proposed at the last meeting (6) were elected members of the Institute.

Mr. G. W. Smith, the Chairman of the Committee, introduced the subject of Melsen's Improvement in the Manufacture of Sugar, when he exhibited the specimen of sugar which was omitted on the meeting of February.

Dr. Turnbull then read a short paper upon this subject, and exhibited the result of some experiments with the bisulphite.

Mr. R. S. R. Andrews exhibited specimens of Artificial Ice, which excited considerable interest on the part of those present by its novelty. Mr. A. intends opening a skating saloon during the coming summer.

Mr. Smith, at the request of several members of the Institute, made and exhibited the Phantascope of Prof. Locke, of Cincinnati; by means of which some very curious optical phenomena can be easily exhibited, and many of the laws of binocular vision illustrated. Those who are acquainted with the Stereoscope of Prof. Wheatstone, will perceive that the Phantascope is but a simple and ingenious modification of that beautiful instrument, which was also exhibited by Mr. Smith.

A new and improved Railroad Chair was brought before the meeting, and its principle explained by Prof. Cresson. It is the invention of Mr. Thomas S. Speakman, and was referred to the Committe on Science and the Arts.

Mr. Rodgers exhibited specimens of beautiful new Stoneware, resembling porcelain, from Bennington, Vermont, composed of white quartz from the White Mountains, and flint from the Green Mountains, of great hardness and durability.

Prof. J. F. Frazer exhibited specimens of Limestone and Coal from California, sent for analysis. Some discussion arose as to the nature of the Coal, its composition being as follows:

Color, black; Lustre, resinous; Fracture, conchoidal; Splits into rhomboidal pieces; Streak, brownish-black; Sparkling; Specific Gravity, 1·314; Cokes very easily, and is very dry; Ash, brownish-red, with very little grit.

ANALYSIS:—

Loss at 212° (water, &c.)	4·9
" red-heat (bitumen, &c.)	49·5
" by burning (free carbon)	42·9
Remainder (ashes)	2·7
	100·0

No trace of sulphur.

From microscopic examination and test. It appears to be not a true coal, but a lignite. The composition of the Limestone was as follows:

Color, drab; Earthy appearance, with frequent sparry veins; Specific Gravity, 2·63.

Silica,	0·30
Ox. Iron and Alumina,	1·40
Carbonate of Lime,	97·80
Carbonate of Magnesia,	trace.
Water,	0·25
	99·75

At the request of the Chairman, Mr. Solomon W. Roberts made some remarks upon Bridges. He referred to the importance of economy in their construction, as large sums were often expended in such structures, when a less amount would answer the purpose. Suspension bridges supported